BIRD-BANDING

A Journal of Ornithological Investigation

Serial Dept.
SEP 24 1957
McGill Library

VOL. XXVIII July, 1957 NO. 3

BS

PUBLISHED FOR
THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
AND
THE INLAND BIRD-BANDING ASSOCIATION

CONTENTS

PAGE

BANDING WITH MIST NETS
By *Seth H. Low* 115

THE ANNUAL POST-NUPTIAL MOLT IN THE WHEATEAR *(Oenanthe oenanthe)*
By *Kenneth Williamson* 129

SOME TUFTED TITMOUSE LIFE HISTORY
By *Amelia R. Laskey* 135

CHANGES IN SEX RATIO OCCURRING WITH AGE IN YOUNG CALIFORNIA QUAIL IN CENTRAL OTAGO, NEW ZEALAND
By *G. R. Williams* 145

DISPERSAL FROM A BANDING STATION: STARLINGS AND ROBINS
By *John T. Nichols* 150

THE NIGHT DRIVING OF COOTS FOR BANDING ON THE WINTERING GROUND IN LOUISIANA
By *Leslie L. Glasgow* 153

AN IMPROVED DRYING FORM FOR BIRD STUDY SKINS
By *Merrill Wood* 156

DISEASES AND INJURIES OF JAMAICAN BIRDS
By *Charles H. Blake* 157

GENERAL NOTES:—A medium-dull White-throated Sparrow in its seventh winter, 160; Winter Territorialism of Gray Shrikes *(Lanius excubitor)*, 160.

RECENT LITERATURE:—Banding, 160; Migration, 163; Population Dynamics, 167; Nidification and Reproduction, 168; Behavior, 170; Ecology, 175; Wildlife Management, 175; Parasites and Diseases, 176; Physiology and Psychology, 177; Plumage and Molts, 178; Zoogeography, 178; Food, 182; Song, 183; Books, 184.

NOTES AND NEWS 185

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

Vol. XXVIII July, 1957 No. 3

BANDING WITH MIST NETS

By SETH H. LOW

The Japanese mist net, introduced to American banders by Dr. Oliver L. Austin, Jr. in 1947, greatly increases the scope of the average bander's activities. Before its introduction banders were limited largely to trapping species that respond readily to bait, particularly to grain and seed mixtures. The mist net allows banders to handle a far wider variety of species and larger numbers of individuals than heretofore, even compared to water-drip traps which have been successfully used by some stations. Highly non-selective, the net catches almost everything that flies into it. It allows the bander to take swallows, flycatchers, vireos, warblers, and thrushes in quantity as easily and safely as he traps seed-eating fringillids and icterids.

Whether at home or afield, mist nets give the bander an operating versatility unobtainable with traps. Nets can be shifted easily and quickly from place to place to make the most of the opportunity of the moment. Yesterday along the multiflora hedge for warwings, today next to the weed patch where the goldfinches are feeding, tomorrow between the brush piles in the orchard for juncos and sparrows, next week on the marsh for snipe, and later on the dike between the ponds for sandpipers; at Point Pelee, Ontario in May or at Cape May Point, New Jersey in September for migrants galore; amidst the pines in Michigan for the rare Kirtland's or in Pokomoke Swamp in Maryland for the elusive Swainson's Warbler, the mist net is equally useful and efficient in all.

Banders have always obtained more realistic impressions of the numbers of individuals of a species present or passing through an area than have observers, and nets produce a far more accurate and reliable sample than do traps. They often intercept species that pass through completely undetected by the bird-watcher and the trapping bander. At Cape May Point, New Jersey, with more than a thousand bird-watchers combing a relatively small area, we have more than once netted species that were otherwise unobserved. Birders by the score have combed the outer arm of Cape Cod every summer and fall without spotting a Water-Thrush, yet the nets at the Austin Station there take a dozen or so of them regularly every August and September. Since using nets, I have been surprised to find my traps were taking only a portion of the Song Sparrows and Juncos present, and that a number of my returns from prior years for these and other species are retaken only in the nets.

The purpose of this paper, however, is not to extol the potentialities of netting but, on the basis of my own personal experience, to try to advise potential and new netters on the techniques of using them. I was fortunately one of the first to receive some of these nets from Dr. Austin for trial, and I have used them regularly ever since at my banding station on my farm in Maryland. At my station nets do not supplant traps, but they do supplement them and relegate them to a secondary role.

My banding operations are limited mostly to weekends and holidays, and occasionally to brief periods before leaving for the office in the morning and after returning home in the evening. I have a few all-purpose and several Glenhaven trip-door (Potter type) traps. These are always kept baited and are operated frequently from early fall to late spring. Except for sunflower seeds, which are placed in special dispensers, all feed (bait) is placed within the traps. Except when the traps are actually in operation, the birds can enter and leave them at will. Nets are erected only when the station is operating, and are *never* left up unattended.

The role of nets and the extent to which they may successfully supplement or supplant traps at a particular, permanent station depend on too many factors to permit more than a few generalizations. Sufficient space, variety of habitat, climate, exposure to and frequency of winds, and the prevalence of children, dogs, cats, livestock, and predators are just a few of the considerations. In the south nets may be used the year round; in the north cold weather curtails their use during the winter.

When deciding whether or not to use mist nets, suitable sites, prevalence of birds, and available time are secondary considerations. Nor is experience as a trapper any criterion for judging your potential as a netter, though a year or two's experience trapping and banding is essential for a full appreciation of the time involved, of the detail with which records must be kept and submitted, and of the accuracy required in identifying, aging, and sexing the many species of birds handled at a successful banding station.

The most important factor is *your own* ability and adeptness in removing birds from a net. Keen eyesight at close range, a fine sense of touch, deft fingers, and the proper equable temperament are essentials. Before acquiring or trying to use a net, I strongly advise the potential netter to receive first-hand instructions from an experienced netter, and to test his or her own ability and adeptness by actually removing a number of birds from a net.

DESCRIPTION

Mist nets are made in Japan of fine silk or nylon thread, dyed black to make them invisible when set against a dark background. The netting, best described as similar in texture and structure to a hairnet, is mounted loosely on a taut frame of strong twine, crossed by horizontal braces called "shelfstrings" of the same twine about 1½ to 2 feet apart. The excess netting hangs in a loose bag or pocket below each of the lower shelfstrings. A bird striking the net falls into this pocket and remains there quietly until removed.

Nets for upland birds are made in two mesh sizes, a smaller one with meshes ¾ inches long (on a side), a larger one 1¼ inches. The smaller mesh, hereinafter called the small bird size, is the more useful for general banding. While some individuals of the smallest species, hummingbirds, wrens, creepers, and kinglets, will slip through occasionally, this mesh will stop and hold most birds up to the size of the Kingfisher, Flicker, and Sparrow Hawk, and sometimes even larger ones. However, considerable wear and tear of the nets must be expected with medium-sized birds, and strong-legged birds such as grackles and jays often damage the netting.

Nets of the larger mesh are often referred to as thrush, snipe, or blackbird nets. Most banders will have little if any use for nets of the 1¼-inch mesh. The netting is stronger and does not tear as readily as does the small bird mesh, but it is harder on the birds. The threads cut into the flesh more easily. I am not sure whether this is due to the difference in the thread, or the result of a sawing action and leverage the greater spacing of the larger mesh gives the birds.

These "thrush" nets will stop and hold species that normally rip right through the small bird nets, such as ducks, hawks, pheasants, and large herons, but small songbirds will slip through the larger mesh. Though this is an asset to the professional who wants to band only a particular larger species, it is a disadvantage to the amateur bander. Shorebirds, blackbirds, and even larger species are more difficult to remove from these nets than from the small bird nets and, despite their name, I consider them definitely not suitable for thrushes.

Mist nets are made in standard lengths of 10 or 12 meters (they vary from 30 to 38 feet, depending on the manufacturer). Their height, usually from 3 to 7 feet, is determined by the number of shelves, commonly from two to five.[1] The ideal net for general banding is one of four shelves. This has five shelfstrings running lengthwise of the net, one at the top, one at the bottom, the other three spaced equidistant between them. At each end of each horizontal shelfstring is a heavy loop for attaching the net to its supports.

The nets available from various Japanese manufacturers vary considerably in quality. Strength, smoothness, and freedom from knots of the shelfstrings, and resistance to change in length with humidity are features of the better grade of net. The amount of slack in the netting, both vertically and horizontally, is another important consideration, and it is seldom ample in the cheaper nets. The netting should be about 10 percent longer than the stretched shelfstrings; a 30-foot net should have about 33 feet of netting horizontally. When the lateral slack is insufficient, it can be increased by shortening the shelfstrings, which also shortens the net. This is the only adjustment that can be made in the net's structure.

[1]The standard lengths have been found by the Japanese the most convenient size to handle. Shorter or longer nets can be obtained on special order, and they can be made with any number of shelves. Japanese market netters in the highlands sometimes use nets of 15 to 18 shelves, from 25 to 30 feet high. These require elaborate permanent sets with special raising and lowering gear, and are quite expensive.—O. L. A., Jr.

Vertical slack between the shelfstrings, an equally important consideration, can be adjusted by spacing the shelfstrings properly when setting the net. The netting should fall 3 to 4 inches below each shelfstring, except of course the top one. If the pocket thus formed is too shallow, it will hold fewer birds; if it is deeper than necessary over-all height is sacrificed needlessly and the birds will become more entangled and be harder to remove. A four-shelf net of good quality when properly set stands about 6 feet high; when stretched vertically to its utmost, eliminating all vertical slack, it may stand 1½ to 2 feet higher.

Compared with the cost of traps, mist nets are quite inexpensive. The best four-shelf nets cost from $2.50 to $5.00 each, depending on the length. Inferior nets are obtainable for a dollar or two less, but they are just not worth buying from any point of view. They do not wear or last as well and, much more important, they do not take birds as safely or as efficiently as do those of the better grade (see page 127).

While I have not used nets from every available source, I have tried quite a number of the different ones that have been brought into this country. Of these the only ones of top quality, in my experience and opinion, are those imported by Dr. O. L. Austin, Jr., and which are now being distributed exclusively by the Northeastern Bird Banding Association.

NET SITE SELECTION

The mist net operates by intercepting birds in flight. Success depends on the bird's failure to see the net in its path until it is too late for it to stop or swerve aside. This situation is best fulfilled by setting the net where the birds will hit it in full flight, and where it is as invisible as possible at a short distance.

The invisibility of a net, assuming it is not in motion, depends on the background behind it. A dark and broken background is much better than a light or uniform one. Woods, thickets, shrubbery, hedges, fields, and fencerows make fine backgrounds; sky, water, snow, beaches, and white buildings are poor ones. Against a good background, which need not be close to the net, the net may be out in the open and in full sunlight. It is a simple matter to step back a few yards and check the visibility of your net.

Nets do not work well if exposed to wind. Even a light breeze will cause motion that reveals the net's presence. Also, unless directly abeam, wind blows the horizontal slack to one end of the net and leaves most of the netting stretched too taut. Thus, except in calm weather, shelter from the wind is an important consideration in site selection.

Various hazards have to be kept in mind. When invisible to birds, the net is equally so to people, livestock, dogs, rabbits, deer, and other animals. Any of these crashing into a net will tear it to pieces. Precautions must be taken to select a site with a minimum of such hazards. Setting the bottom string at least 12 to 18 inches off the ground will let small animals pass under it, but an appreciable percentage of the low-flying birds will do likewise.

With the background, wind, and various hazards all in mind, all that remains is to find a place where birds tend to fly back and forth

fairly low. Woodland borders and edges are far more productive than sites well within woods or out in the middle of a field. Paths along the edges of thickets, gaps in hedges, tree lines, fencerows, and between buildings and shrubbery are excellent. Sites may be created by landscaping and planting, and by cutting gaps and lanes in shrubbery. I find a set between a feeding area and near-by cover usually better than one in the midst of a feeding ground.[2]

At home banding stations the establishment of permanent netting lanes is an excellent practice. When not limited by space, habitat, and other considerations, it pays to have more permanent lanes than the number of nets one can normally handle. Then one has a choice of sites on any particular day according to wind direction, species present, and the locations being favored by the birds. Quick shifts can be made in a matter of minutes as circumstances dictate.

PREPARING THE SITE

Whether netting at a permanent home station or at casual locations afield where birds are tending, preparing the site properly before setting the net will prolong the life of your equipment immeasurably. The netting will catch on the slightest obstruction, and removing all possible snags beforehand prevents needless rips and tears.

The usual procedure is to stretch the net between two posts, trees, or other supports, making it fast at each end by the loops at the ends of the shelfstrings. The lane where the net is to hang between its supports must be straight[3] and clear of all vegetation at least 2 feet on each side of the net. This not only allows the operator room to walk on each side of the net, but prevents the net snagging on vegetation when the wind billows it out.

Usually the height of the bottom shelf will determine the over-all height of the net, but the top shelfstring must be no higher than you can reach conveniently. To prevent birds passing under the net, the bottom shelfstring should be within 6 or 8 inches of the ground.[4] When this close to the ground, the ground surface must be clear of litter and snags. The best surface for a net lane floor is bare soil, or else a smoothly mowed strip of lawn grass. If the lane does not have a suitable floor, the bottom strand must be set high enough to keep the netting off the ground when pulled down by the weight of a bird.

When the bottom strand is set close to the ground, two additional considerations must be kept in mind. A bird in the bottom shelf, if able to get its feet on the ground, will spring up again. This leads to double and triple pocketing, which makes the bird much more difficult to remove. A bird in the bottom shelf is also much more vulnerable to predators than one higher up.

[2]I have had considerable success netting in feeding areas. At my banding station in suburban West Hartford I keep my permanent net lanes lightly baited at all times to keep birds frequenting them.—E. A. B.

[3]The lane can be "dog-legged" by standing a smooth pipe or pole at the angle of the lane and bending the net around it.—E. A. B.

[4]The Japanese usually set their nets about 2 feet off the ground. At permanent sets they block this space with rice straw thatching.—O. L. A., Jr.

For net supports both at permanent station sets and for roving use, I have found the 7- or 8-foot steel fence posts with punched-out hook fasteners, either the angle or the channel type, to be most suitable. They are easily transported on the standard auto carrier racks, and easy to drive into the ground with a pipe-type post driver.[5,6]

SETTING THE NET

When not in use I keep my nets folded in small individual cloth bags. An alternative is to roll each net into a ball, or to wind it on a cardboard mailing tube or a board. This takes longer, makes the nets bulkier to store and carry, and involves an additional item of equipment, the tube or board.[7]

To keep the shelfstrings taut and yet provide some "give," I insert a heavy elastic band (no. 84)[8] between each shelfstring loop and the post at each end. Thus my supports are roughly 6 inches farther apart than the distance between the ends of the loops. The shelfstrings of top-quality nets stretch or shrink very little, and the rubber bands take care of it. When they change too much, either the posts must be shifted, or adjustment made by adding or subtracting bands. If so troubled, the factory strings may be replaced with good quality black nylon fishline.

Mist nets are interchangeable end for end and top for bottom, so it makes no difference which end or side you start with in setting or

[5]The roving Japanese netter goes afield with a bundle of light bamboo poles 8 to 10 feet long over his shoulder and his nets rolled up in a burlap sack. He sets his two- and three-shelf nets by putting the loops at one end over the first pole and shoving it into the ground; then he unrolls the net, puts the other loops over the second pole and pulls the shelfstrings tight before sinking the second pole firmly to hold them so.

For beach use I have found 8- to 10-foot lengths of ¾-inch galvanized steel pipe ideal, and have made long (and successful) sets of five nets in series between six poles. I put the poles through the loops before sinking them firmly into the sand. When stretched taut enough, the loops stay in place on the pipe without braces or ties.—O. L. A., Jr.

[6]Where weight and space for transportation are a problem, I carry 4-foot lengths of ½-inch steel galvanized thinwall electrical conduit. Two of these, plus a standard conduit connector, make an 8-foot pole, or over 6 feet above ground. The threadless joint is reasonably steady, especially if the end poles in a line are guyed. The poles are too thin to drive, but fit nicely into holes made with a 2-foot steel pin (made by a local blacksmith for about $1.25), pointed at one end and driven with an ordinary hammer. To hold the net loops each 8-foot pole has 5 holes drilled about 17 inches apart for 3/16-inch bolts 2 or 2½ inches long, inserted so that half projects on each side. I add a 6th at the bottom, 6 inches below the 5th, to give some option in the height of the lowest shelf depending on the roughness of the ground. Regular steel pipe with threaded connectors make much more rigid supports than the conduit, but weigh twice as much. The standard steel fence post, however, remains the best support if space and weight are not problems. Essential clearing tools to carry afield are a machete or small hatchet, a pair of hand pruners, and a small pruning saw for disposing of fallen trees or large branches.—E. A. B.

[7]The small plastic bags now available for icebox storage are ideal for storing and carrying nets.—O. L. A., Jr.

[8]I prefer no. 33, which is the same length and thickness, but is only a quarter as wide: 3½" x 1/32" x ⅛".—E. A. B.

taking down. I mark an outside loop on each end of my nets with a small tag, first to identify the net with its particular permanent site, second to facilitate selecting the top loop from among the five.

Removing the net from the bag, I hang the tagged loop on the top hook of the first post and back off to the second post unrolling the net as I go, taking care to keep it taut enough so it doesn't drag on the ground or billow too far to the side. I place the tagged loop on the other end on a hook at the desired height on the second post and attach the other four loops down the post at the proper intervals. Returning to the first post I attach the remaining loops to match those on the second post. The whole operation seldom takes more than 2 or 3 minutes.

To test whether or not your net is set properly, watch it from one end as the birds strike it. If they bounce off on a quiet day, there isn't enough slack in the netting. Remedy the horizontal slack by shortening the shelfstrings as described above. Insufficient vertical slack can be remedied by moving the shelfstrings closer together. Do not expect the nets to work well in any wind except possibly a light breeze directly abeam.

When taking a net down, first clean all twigs, leaves, feathers and insects out of the netting. Then place all the loops together on one hook on post #1. Walk to post #2 and lift the loops off the hooks, working from the bottom up, and hold them in one hand. Now walk back toward post #1, folding the net back and forth between your outstretched hands, and keep it taut so it does not billow to one side or drag on the ground. End the folding operation so that one set of loops is held in each hand. Hold one hand high and let go with the other so the net hangs in folds from the high hand. Now roll up the folded net and insert it in its bag. One set of loops with tag will be rolled inside the net, the other exposed on top for ready identification when resetting. The whole operation should take even less time than setting.

Instead of taking the net down, it may be made inoperative by placing all the loops together at the top of each post. If the net so furled is to be left more than an hour or so, it is advisable to make ties around the netting about a yard apart. This prevents the loose net from billowing and minimizes the chance of a bird being caught in the furled net.

REMOVING BIRDS FROM THE NET

This is the crucial phase of netting. It is strictly up to the bander himself. There are no special tools or gadgets that can be used to compensate for one's own lack of competence. The only mechanical aid occasionally needed is a pencil or some similar dull-pointed instrument. Keen eyesight, a good sense of touch, and dexterous fingers are essential; patience, perseverance, and perception valuable assets.

Removing a bird from a mist net is normally a one-man proposition. Under most circumstances one person can remove a bird more expeditiously and successfully than can two people trying to work together.

Visitors and other banders present should remember this and keep their hands off the bird and net except as specifically called upon by the person removing the bird.

One can be neither too fast and too rough, nor too slow and too painstaking. Both can be harmful to the bird, and its welfare is the prime consideration. Proficiency can be obtained only through practice and experience. When proficient, one will find that he can remove birds after dark by feel without a light—but a light is most helpful, so pamper yourself and the bird, and make it as easy as possible.

For what might be termed a simple and normal catch, the standard procedure for removing a bird is as follows:

1. Ascertain from which side the bird flew into the net, and work from that side.
2. Find the opening of the pocket, and make sure you have a clear passage to the base of the legs at the bird's abdomen with no netting intervening.
3. Reach into the pocket and grasp the bird by the legs close to the body between two fingers of one hand.
4. Lift the bird up by the legs and out your side of the net as far as the slack permits. Hold the bird out away from the net so that the netting exerts a slight strain. This helps peel and pull the netting away from the bird and, incidentally, keeps the bird from grasping the netting again with its toes.
5. With your free hand peel and push the netting down the legs and off over the toes. Continue to hold the bird by the legs, keeping the feet toward you and away from the net.
6. Now free the tail and work the netting forward up the body to the wings.
7. Work from the under (inner) side of one wing and ease the loops of netting over the bend of the wing (this is where a pencil sometimes helps). Free the other wing in the same manner.
8. When the wings are free, shift your grasp to hold the wings from flapping, keeping the legs safely in your palm at the same time.
9. Free the head last, working a layer at a time from the neck over the head.

Circumstances dictate variations in the above procedure. One of the most frequent is to free the head after freeing one wing and before freeing the other. Once in a while, the head may be freed before either wing. Rarely does one free a leg last, and such cases usually involve a leg with a band already on it.

In cases of double-pocketing, it is often necessary to start on the opposite side of the net to free the folds encompassing the original pocket. When the original pocket swings free of the adjacent netting, you hope the bird will remain quiet until you can get around the other side and reach in to grasp its legs. If the bird flutters, it may complicate matters so you have to start all over again. If the bird is near one end of the net, or at the top or bottom, it is best to hold the bird in the original pocket away from the net with one hand and reach around, over, or under and secure its legs with the other hand. If successful you can usually pull the bird to your side for removal.

When a bird is very badly tangled and no progress is being made in clearing it, the netter must be prepared mentally and equipped with a sharp knife or a small pair of scissors to snip enough strands of the netting to free the bird (be sure no pieces of mesh are left on the bird).

NOTES ON OPERATING WITH NETS

When tendings nets, the operator soon learns the desirability of wearing clothes with few, if any, exposed buttons. Buttons, especially on cuffs, readily become fouled in the meshes. Wrist watches, tie clasps, zipper tabs, pens and pencils in outside pocket, and similar items will snag and tear the netting very easily, and are time-consuming nuisances to unsnarl. The safest outer garment for a netter to wear is a long-sleeved, buttonless, pullover sweater.

Number of nets. The number of nets a bander can operate safely by himself depends on a number of considerations, but primarily on the number of birds to be handled and his speed in handling them. When the weather is favorable and a normal number of birds are present, I generally operate from 6 to 10 nets on my farm. When I have more than one or two nets up I plan on doing nothing but devoting my full time and attention to them. Under normal conditions any competent and experienced netter should have no trouble handling 4 to 6 nets at his home station if the sets are not too far apart. A continuous line of nets may be tended much more readily than the same number of nets scattered about in several sets far apart.

The netter must exercise good judgment and self-restraint to avoid setting more nets than he can handle properly. With traps, catching more birds than can be handled in the time available is no problem —one simply opens the traps and lets the birds fly away. With nets each and every bird must be extracted and released individually, one by one. You cannot dash off to an appointment leaving a net set and unattended. Start taking down the nets well in advance of any deadline. During the last few minutes a net may catch more birds than you can remove in an hour, and when you are most in a hurry is when you always get the worst tangles to unsnarl!

If you find yourself overexpanded and pressed for time, the best procedure is to take each net down or furl it as soon as it is cleared of birds. If you leave net #1 up while you proceed to clear #2, net #1 may fill up again in the meantime. A net with 20 or 30 birds in it will take relatively few additional birds, as the weight of the birds pulls the netting so taut other birds striking it bounce off. Leave such a net until last and get the others down first.

Holding cages. When the netting is good and you are taking birds in quantity, holding cages are a great help. Without them you have to band and process each bird as you remove it from the net, which delays your removing those still entangled. With holding cages you can clear the net in a hurry and then process your catch at leisure in orderly fashion while waiting for the net to fill up again. When overexpanded or pressed for time, ample holding cages are a *must*. Slip the birds into the cages as fast as you remove them from the net and postpone the banding and recording until later.

Birds may be held safely for several hours in a covered cage that is dark inside. It is well to have enough units so you can separate those species that fight when confined with other birds—grackles, jays, chickadees, woodpeckers, and nuthatches, for example. For this purpose the multicell holding cages developed by Parker Reed for grosbeaks and winter finches are especially useful. (These and Mr. Reed's excellent traps are sold exclusively by the Massachusetts Audubon Society.)

I use holding cages to hold until the following morning all birds removed from a net or trap after dark, except night-flying species. Also if a bird is wet, I hold it until it has dried out thoroughly before releasing it.

Surveillance. Whereas a trap may be left unattended for as much as 3 hours, nets must be kept under close surveillance. Under favorable conditions at a regular station, intervals of up to but not exceeding an hour between visits to a net are reasonable. If he leaves the nets any longer without checking them or leaves the immediate vicinity, the operator is risking trouble.

Weather restricts netting far more than it does trapping. A bird in a net will succumb more readily to exposure, especially to cold and rain, than a bird in a trap. When a bird is held in an unnatural position in a net rain quickly penetrates through the feathers to the skin. It is difficult to extract a soaked bird from a wet net without unintentionally plucking it at the same time.[9] Thus the netter must avoid letting a shower catch him with birds in the nets.

Unless his nets are set in well-sheltered spots, the netter must keep a close eye on the wind. When it rises to "strong," he must clear the nets quickly of birds, giving first attention to those in the upwind part of the net. As the wind blows the slack to the lee end of the net, it exerts a strangling pressure on the neck of any bird whose head is caught in the upwind portion.

In case of either wind or rain, the bander should concentrate on removing all the birds before furling or taking down the nets. A wet or blowing net will take few, if any, additional birds.

Leaving nets set overnight. When birds are migrating during periods of settled weather it is often advantageous, and quite feasible, to leave nets set all night. So doing allows the netter to take fullest advantage of the early morning period when the birds are most active and there is likely to be the least wind. Also dawn and dusk are the most likely times for catching goatsuckers and small owls.

One's first assumption would be that, especially during migration, birds would fly into the net during the night. Such has not proved to be the case. At my station over the past few years I have frequently left nets up all night at various seasons, and they have never taken a bird between total darkness and dawn.[10] At Cape May Point, New Jersey, during the height of the fall migration, we set a line of 18 nets during the late afternoon when the area was virtually devoid of birds. A marked migration came in during the night. The first check of the

[9] In handling wet birds, either netted or trapped, I find it speeds drying and apparently makes them more comfortable to sop the moisture off them with an absorbent tissue such as Kleenex.—E. A. B.

nets at dawn didn't produce a single bird, but a few minutes after sunrise we had some 300. On another occasion the same area was swarming with migrants that moved on at night while the nets were set. Again the nets contained not a single bird at dawn. Thus neither arriving nor departing passerine migrants seem to run afoul of nets after dark.

The foregoing observations, however, apply only to dry, upland habitats. Sets made on beaches, in swamps or marshes, and over or next to water are extremely likely to take birds during darkness and must be tended continually through the night.[11]

When nets are left up overnight at an upland station, they *must* be checked thoroughly with a flashlight after it is actually dark. Some birds, notably thrushes and White-throated Sparrows, go to roost quite late and get caught just at dusk. A headlamp type of flashlight is the best for the netter, as it leaves both his hands free and permits him to direct the light wherever he is looking.

It is not wise to leave a net set overnight close to roosting cover if there is a possibility that the birds might be disturbed and flushed during the night. For example, turning on an outside light or slamming a door will often flush birds from nearby shrubbery.

The presence of deer and the prevalence of night-flying insects or falling leaves are good reasons for not leaving nets up at night. If large owls are common in the vicinity it is also inadvisable. The small bird nets will take Screech and Saw-whet Owls, but will seldom stop and hold Barn, Barred, or Great-Horned Owls. Also the weather expected during the night and next morning is an important consideration. Rain, fog, and even a heavy dew will form droplets on the netting and make it conspicuous.

When leaving a net up overnight, I raise the lowest string high enough to give rabbits, opossums, cats, and other night prowlers room to pass under the netting. On the dawn round I return the bottom string to its proper position, redistribute the slack in the netting, shake out the leaves and water droplets, and kill the flying beetles with the banding pliers. I postpone dissecting and removing the beetles until both they and the net have had a chance to dry out.

The bird in the net. Mist nets do not hold all species with equal success, for no two species react identically when they hit the net and find themselves caught. Most small birds, in my experience, tend to lie quietly without struggling once they are down in the pocket—but there are exceptions. Warblers and vireos are among the easiest to take; they lie quietly, seldom tangle themselves badly, and can usually be removed in a few seconds. Among the worst at my station are the Chickadees,

[10]Confirmed by 27 years of netting, first with Italian, then with Japanese nets at the Austin Station. We always leave the nets up overnight in good weather, and have never had a casualty thereby.—O. L. A., Jr.

[11]Night netting can be extremely productive in such habitats when the birds are flying. The nets are so invisible in the darkness they can be set right out in the open against sky or water backgrounds. I have caught quantities of migrating shorebirds in thrush nets at night on the open Cape Cod beaches. On dark, moonless nights the Japanese net ducks over open marshes with much heavier, single-shelf nets of 2½-inch mesh.—O. L. A., Jr.

Titmice, and Cardinals.[12] They flutter and fight the net continually, gather fold after fold of netting in their claws, and tangle themselves badly. The sooner such birds are taken out after hitting the net, the better; the longer they are left in the net, the more difficult they are to remove without injury. Providing quantities of sunflower seed at points away from the net reduces the catches of these species.

In small bird nets, some of the larger birds, particularly the Brown Thrasher and Mourning Dove, tend to lie in the pocket on their backs without becoming enmeshed and often flip themselves along the fold of the netting and escape out of the end. This difficulty is also experienced with shorebirds and other species that do not grasp the netting with their feet. Meadowlarks, Coots, and most Rails frequently clamber out of the pocket and escape. Under normal operating conditions the operator should remove these species first before working on the well-caught birds.

With nets the percentage of repeats is far lower than with baited traps. Nets do not encourage migrants to stop and linger in the vicinity. Resident birds around a netting station soon learn where the regular net sites are and avoid them. I often see my resident Cardinals fly up and over or around my net lanes even when the nets are not strung.

CASUALTIES IN NETS VERSUS TRAPS

In evaluating devices for capturing birds for banding, two considerations are of utmost importance, safety and efficiency. The device must not only take birds efficiently in quantity and variety, it is even more important that it allow the bander to capture, hold, and release the birds in as good condition as they were just prior to capture.

I have never seen nor heard of a trap that was 100 percent safe or 100 percent efficient. Well constructed, individual-cell, trip-door traps are reasonably safe, but far from efficient (except for winter finches, such as the Evening Grosbeak). Large traps, such as the all-purpose and house-trap types, are more efficient but less safe. More important than the type and design of the trap are the quality of the materials and the workmanship in its construction. These may increase the cost of traps of identical size and design as much as $20 to $50. Not all banders can afford the quality of trap built by such a superior craftsman as Parker Reed!

Even with top-quality traps, some injuries are unavoidable and occasional casualties have to be expected. A bird hopping into a treadle trap may drop the door on another bird just on the threshold. In a cell by itself a bird may bloody its forehead, blunt its bill, hit its head and suffer a concussion, pull off a toenail, or break its leg. When two birds are confined together, one may injure or kill the other.

In a cell by itself in a trip-door trap, a bird is relatively safe from external hazards, providing the trap is inaccessible to predators and cannot be crushed or upset. However, it is impossible to prevent shrikes, small hawks, weasels, chipmunks, and other predators from

[12]On Cape Cod our worst problems are Chickadees, Brown Creepers, and Rose-breasted Grosbeaks.—O. L. A., Jr.

entering maze and funnel-entrance traps. Often they can leave again with their victims, sometimes without the bander being aware of it.

By keeping constant close watch on his traps and removing each bird the moment it is caught, the bander can reduce his casualties from a reasonable 1.0 percent or less to virtually none, but his efficiency will drop 50 percent or more thereby. So slight a gain in safety hardly seems to justify the large loss in efficiency.

With nets, as with traps, some casualties are bound to occur, but the casualty rate in properly operated nets should be no higher than with traps. I have caught tens of thousands of birds with nets, and even more with traps. While I have kept no accurate record of casualties, I am confident that my casualty rate for either nets or traps or both has never exceeded 1 percent of the total take, and is normally only a fraction of that.[13]

Casualties and injuries are attributable either to the equipment or to the operator. With traps, reasonably operated under normal conditions, more casualties can usually be attributed to the trap than to the operator. With nets most of the casualties are chargeable to the operator rather than to the net itself. In my fairly extensive experience, a bird is less likely to kill or injure itself in a net than in a trap, and my losses to predators with nets runs considerably lower than with traps.

Net casualties are higher in nets of poor quality and in nets poorly or improperly set. With a net of good quality properly set, almost all the catches are "clean," by which I mean the bird creates a full pocket and lies in it instead of hanging fluttering from the meshes by a leg, a wing, or its head. A good set cannot be made with a poor net, but a good net can be set badly. With a poor net or a badly set good net, many birds bounce off without being caught, and a substantial portion of those caught are not caught cleanly.

Recently several banders have published criticisms of netting (Brewer *et al.*). I doubt that these critics have had adequate experience themselves with good nets, and strongly suspect they were moved to complain by observing netters who were inexperienced and perhaps in some cases those using poor nets. Such criticisms are not an indictment of netting, but of the individual operators concerned.

PUBLIC RELATIONS

Banding in an area accessible to and frequented by the public, unless very close watch is kept on equipment, invites interference with, damage to, and possible theft of traps and nets. The success of any banding site is usually in inverse proportion to the amount of human activity in the immediate vicinity. When not disturbed, birds in nets or traps usually remain relatively quiet. The more they are disturbed before removal, the harder they will struggle to escape, consequently increasing the risk of injury or exhaustion.

Good public relations for banding make it inadvisable to set either

[13]We have always kept records of our trapping and netting casualties at the Austin Station. Our casualties over the years from all causes, including predation, have averaged 0.5 percent of the total number of birds handled, and are almost equally divided percentagewise between birds in nets and those in traps.—O. L. A., Jr.

nets or traps where they are likely to be observed by the general public, particularly if the operator has no control over when and by whom they are seen and lacks the opportunity to explain to each casual observer just what is going on. Examples are sets near and in view of people walking along a sidewalk, driving by on a road, or commuting past in a train.

Poor judgment in when, where, and how banding operations are carried on can do irreparable harm. Uninformed or misinformed spectators may spread exaggerated rumors and make needless complaints to game wardens, the police, and other authorities. Such bad publicity hurts not only the individual bander, but the program as a whole.

The use of nets and traps, however, is no "hush-hush" operation. Every operator of a banding station, whether using nets or traps, should make a special point of contacting and briefing his neighbors on his activities, and also such regular visitors to his premises as the postman, deliverymen, meter reader, and garbage collector.

Banders should welcome individuals and small groups to their stations and make the most of such opportunities to inform the visitors on how and why we band and to enlist cooperation in reporting band recoveries. There is no good reason why visitors should not be shown birds in nets and traps properly set, operated, and tended, and allowed to watch a competent and experienced bander remove and band the birds.

Nevertheless the operator of a banding station, particularly one using nets, will learn quickly from experience that it is inadvisable to admit visitors unless he can supervise them closely. When large numbers of visitors are involved, it is best to exclude them from the actual trapping area and to bring the birds out in gathering cages to an assembly point for the visitors to see. An outstandingly successful example of how to handle such relations with the public is the banding station run by Dr. and Mrs. Paul H. Fluck at Washington Crossing State Park, Pennsylvania.

REFERENCES

Anon. Mist Nets Legalized in California. *News from the Bird-Banders,* **32**(1): 4-6, January, 1957.

Austin, Oliver L., Jr. 1947. Mist Netting for Birds in Japan. Natural Resources Section, Report No. 88, GHQ, SCAP, Tokyo, pp. 1-24.

Bergstrom, E. Alexander. 1956. The Safety of Birds in Nets. *EBBA News,* **19**(6): 75-80, November-December, 1956.

Bleitz, Don. 1957. On the Use of Mist Nets. *News from the Bird-Banders,* **32**(2): 22-25, April, 1957.

Brewer, H. W., et al. 1956. Nets More Harmful Than Beneficial. *EBBA News,* **19**(6): 74-75, November-December, 1956.

Dennis, John V. 1956. Mist Netting. Some Notes and Observations. *EBBA News,* **19**(4): 53-56, July-August, 1956; **19**(5): 60-63, September-October, 1956.

Detwiler, Rev. Garrett S. 1957a. To Net or Not to Net. *EBBA News,* **20**(1): 9-11, January-February, 1957.

——— 1957b. Banding With An Expert. *Ibid.,* p. 13.

Dumont, Mrs. Gustave A., Sr., 1957. Re Mist Netting. *Ibid.,* p. 14.

McClure, H. Elliott. 1956. Methods of Bird Netting in Japan Applicable to Wildlife Management Problems. *Bird-Banding,* **27**(2): 67-73.

Route 2, Gaithersburg, Maryland.

THE ANNUAL POST-NUPTIAL MOLT IN THE WHEATEAR *(Oenanthe oenanthe)*

BY KENNETH WILLIAMSON

In those migratory passerines which undergo a complete post-nuptial molt the change proceeds with greater rapidity than in sedentary species, an adaptation to the need to assume a full set of remiges and rectrices in time for the fall migration. The Wheatear *(Oenanthe oenanthe)* affords an excellent example. It is a common summer visitor to Fair Isle[1], where it is single-brooded between the middle of May and early July, though a few late pairs may still be attending young at the beginning of August. The young of the year, which molt only the juvenal contour-feathers and median coverts (sometimes also a few lesser and inner major coverts) when from 5-8 weeks old, leave from the middle of August, the adult birds following at the end of the month and in early September. The first week of September is the peak-period for passage of larger birds which have nested in Greenland and Iceland, *Oenanthe oe. leucorrhoa* and *schiøleri*. The data on which this note is based have been collected during laboratory examination of local birds trapped at Fair Isle Bird Observatory over the past 8 years, and incorporate observations on some 80 individuals, a few of which have been captured on more than one occasion during the period of the molt.

The molt commences about the time the young leave the nest, during the last week of June, and before they achieve independence of their parents in the second week of July. Some birds have already finished by mid-August. A ♀ "A 62.580" which had just started on June 29, 1956 had to all intents and purposes finished by August 17, the ninth primary and innermost secondaries being a little short of their full length. The period occupied by the change is therefore of the order of 7-8 weeks.

The sequence of the molt is the same as in other ten-primaried oscines studied at Fair Isle[2], beginning with the innermost primary and its covert, the change proceeding outwards[3]. The tertiaries (which Witherby *et al.* (1941) call the "long innermost secondaries," but which molt as a distinct group and should be separately identified) and the mid-wing coverts are the next in turn. Here the outermost greater or major coverts are a little ahead of the inner ones as a rule; they are succeeded by the lesser or minor coverts, and finally the median group. The replacement of each primary covert is linked with that of the corresponding remex. In many the under wing-coverts are still in sheath when the uppers have finished and the wing-molt is far advanced.

When the replacement of primaries is well under way, molt of the secondaries begins—also in mid-wing, the succession being inwards towards the renewed tertiaries. The bastard-wing (alula) and short tenth primary are replaced during the growth of the ninth primary,

[1]Fair Isle is at Latitude 59 32′ N., Longitude 1 37′ W., off northern Scotland midway between the island-groups of Orkney and Shetland.

and these are normally complete before the innermost secondaries are fully extended. The tail-molt commences early, together with upper and under tail-coverts, shortly after the innermost primaries have begun. Completion of the tailmolt occupies 3-4 weeks: a ♀ without any tail on July 25, but with the new feathers in pin, had a full tail by August 17; and a ♂ with the tail in pin on August 6 had it very nearly complete (51 mm.) on August 28. Body molt also begins early, usually with the sides of breast and rump, closely followed by scapulars, mantle, flanks, the remainder of the under-parts and head.

In the Starling, which is non-migratory in the Shetland region (though some local movement occurs), it seems to be the rule for the remiges to grow singly, so that one is fairly well developed before the next in succession leaves its sheath. In the Wheatear it is customary for the primaries to be renewed two or even three together, especially in the early stages, so that the whole process is greatly accelerated, and is complete in half the time. A 1st-summer ♂ of July 8 had already renewed primaries 1-4, the fifth was protruding from its sheath and the old sixth had been shed; a ♀ on July 9 had the five innermost primaries growing; and a 1st-summer ♂ of the same date had the four innermost in the left wing and the five innermost in the right wing all partly extended. The birds of July 8 and 9 and a number of others at a similar stage had the whole tail in pin, none of the old feathers remaining—examples can be found on reference to Tables I and II.

Naturally, such severe molt interferes with the birds' capacity for sustained flight, and doubtless renders them more liable to predation. Indeed, one is aware of but little activity on the part of adults at this critical period, and the fact that more are caught in the traps sited along the dry-stone walls at this time than earlier in the summer suggests that they keep very much to cover and are less sprightly in avoiding capture. The history of ♀ "A62.580," who was recaptured 9 times between June 29 and August 17, always in the same trap, shows that adults remain on their territories during the period of the molt. Other adults, ♂ and ♀, have been taken twice or thrice over much the same period under similar circumstances.

It would be reasonable to suppose that a rapid physiological process of this nature puts a severe strain on the bird, particularly as it must restrict the normal feeding routine to some extent. Yet there is little evidence of the marked decrease in weight which one might expect to accompany this process, especially during the early period of heavy molt. Such data as we have been able to gather suggest the probability of a gain on "normal" weight before the onset of molt, maintained during this first exacting fortnight, with a slight fall later. Repeat weighings of various individuals gives these results. A ♂ at 25.7 gm. when in molt on July 19 was 2 gm. heavier than in the evening of May 26, a time of day when optimum weight is attained; and a ♀

[2]Starling *(Sturnus vulgaris)*, Meadow Pipit *(Anthus pratensis)*, Rock Pipit *(A. spinoletta)*, Twite *(Carduelis flavirostris)* and House Sparrow *(Passer domesticus)*.

[3]The American notation, in which the first primary is the innermost and the tenth (if present) is the minute outer feather, is therefore the more logical, and it is adhered to in the present paper.

at 24.6 gm. in the early morning of July 25 was 2 gm. better than in mid-afternoon of May 29. Another ♂, only 22.8 gm. in mid-morning of June 4, was 2.6 gm. heavier when in molt at 0415 hrs. on July 13. Less conclusive is a ♀ whose early morning weight of 24.8 gm. on July 16 was a fraction (0.3 gm.) below a mid-day figure for April 28—though if due allowance is made for diurnal variation, this may well represent a real gain. Her mid-morning weight on August 24, with the molt over, was 25.3 gm.

The only long series of weighings is for ♀ "A62.580," who was 30 gm. (a high value for a Fair Isle Wheatear) in mid-morning of June 30 with the change just begun; 29.6 gm. and 28.8 gm. in mid-afternoon of July 14 and 15 respectively; 26.9 gm. in the early morning of July 25; and 26.7 gm. in mid-morning of August 17 with the molt virtually over. A ♂ showed a similar fall from 27.1 gm. on July 11 to 24.5 gm. on August 23, both weighings late in the day. This same bird had shown virtually no change between July 2 and August 3 in the previous year, 1955.

In addition to losing the whole tail and several remiges at once early in the proceedings, it appears to be fairly general in the Wheatear for at least the three innermost secondaries (and sometimes all these feathers) to be dropped at a later stage. Thus, a ♂ on August 3 had a new first secondary and the remaining five partly extended or in pin, while another on this date was without a single secondary in either wing. This condition occasionally leads to an irregular sequence in the development of the new feathers. Most of the records available for the third week of July show completion of the growth of primaries 1-5, following which the birds' incapacity for sustained flight may be less, since it appears to be usual for the remaining four functional primaries to grow in pairs, so that the sixth and seventh are about half-grown when the eight and ninth emerge from their sheaths.

A curious fact is that at this stage the wing-length increases noticeably. This is due presumably to the loosening of the old eighth and ninth primaries before they finally drop away. Our ♀ "A62.580," starting molt with a wing of 100 mm. at the end of June, gradually increased to 103 mm. on July 20, when the inner primaries were fully grown. At the next examination on July 23 the old distal remiges had fallen out and the wing-length, 86 mm., was that of the fifth primary. When taken again 25 days later, with the eighth primary fully grown, the wing-length was again 100 mm. In two days, July 23-25, the seventh primary increased its length by 9 mm. and the longer sixth by only 6 mm., suggesting that growth may be most rapid just after protrusion from the sheath. During the 9 days August 19-28 ♀ "JB 582" extended the ninth primary from the sheath to half its length and the eighth to about three-quarters, whilst the second and third secondaries practically completed their growth.

Molt of the tail is often irregular, sometimes the outermost and sometimes the middle pair taking precedence; once, on August 7, we have "outers half-grown, penultimate pair three-quarters, the rest new"; and once, on August 4, "outers and 2 middle feathers old, rest missing." Molt of the remiges is very rarely asynchronous, but there is a ♀ of

TABLE 1: PROGRESS OF MOLT IN ♂ ♂ WHEATEARS

♂ ♂		PRIMARIES										SECONDARIES						TERTIALS			COVERTS				A	TAIL	
DATE		10	9	8	7	6	5	4	3	2	1	1	2	3	4	5	6	1	2	3	IG	OG	M	L		Inner	Outer
JULY	2	o	o	o	o	o	o	s	s	s	s	o	o	o	o	o	o	o	o	o	s	(s)	o	o	o	o	o
	3	o	o	o	o	o	o	o	o	s	s	o	o	o	o	o	o	o	o	o	o	s	o	o	o	o	o
	8	o	o	o	o	s	(s)	x	x	x	x	o	o	o	o	o	o	x	x	x	(x)	(x)	o	x	o	s	s
	11	o	o	o	o	o	s	(s)	x	x	x	o	o	o	o	o	o	x	x	x	(x)	(x)	o	x	o	s	x
	12	o	o	o	o	o	x	x				o	o	o	o	o	o						s	s	o	x	x
	13	o	o	o	o	o	o	s	s	s	s	o	o	o	o	o	o	o	o	o	s	s	o	x	o	s	o
		o	o	o	o	o	s	s	s	s	s	o	o	o	o	o	o	s	s	s	?	?	?	?	o	s	o
	19	o	o	o	s	x	(x)					x	s	o	o	o	o						s		o	(x)	x
		o	o	o	s	x						s	s	o	o	o	o				x	x	s	x	o	x	x
	22	o	o	o	s	x	(x)					s	o	o	o	o	o						(x)		o	x	x
	23	o	o	o	o	o	o	o	o	s	s	o	o	o	o	o	o	o	o	o	s	s	o	o	o	o	o
	24	o	s	(s)	x	x							(s)	s	o	o	o	x		x			x	x	o	x	x
	25	o	s	s	x	x						s	x	o	o	o	o								o	(x)	(x)
	27	o	o	o	o	o	o	o	s	s	s	o	o	o	o	o	o	o	o	o	s	s	o	s	o	o	o
	29	o	s	x								s	s	s	x	(x)	(x)								o		x
	30	o	s	s	x	x							s	(s)	x	o	o								o	(x)	(x)
AUGUST	1	s	x	x	x	x						(x)	(x)	(x)	x	x	x								(x)		
	3	s	x	x	x								x	x	s	s	s										
	4		x	(x)											x	x	x										
	3	s	(s)	x	(x)								x	s	(s)	o	o								o		
		o	s	x								s	s	s	s	s	s								?	x	x
	4	o	o	o	o	o	s	(s)	(s)	x	x	o	o	o	o	o	o	s	o	o	s	s	o	o	o	o	o
		s	x	x	x								x	x	s	s	s								s	(x)	(x)
	6	x	x	x	x							x	x												s		
	7	o	s	x	(x)							(x)	x	o	o	o	o								o		x
	10	o	o	o	s	x						o	o	o	o	o	o						x		o	x	x
	16		x													x	x										
	20		x	x											x	x	x								x		
	23		x																								
		o	o	o	o	s	x	x	x	x	x	s	o	o	o	o	o	x	(x)	x			o		o	x	x
			x	x											s	x											
	27	x	x	x	x									x	x	x	x										
	28		x	x											x	x	x										
			(x)												x	x	x										
	29		x	x											x	x	x										
	31		(x)												(x)	(x)	(x)										
		(x)	x	(x)	(x)									(x)	(x)	x	x								x		

TABLE 2: PROGRESS OF MOLT IN ♀ ♀ WHEATEARS

TABLE 2: PROGRESS OF MOLT IN ♀ ♀ WHEATEARS

♀ ♀		PRIMARIES										SECONDARIES						TERTIALS			COVERTS				A	TAIL	
DATE		10	9	8	7	6	5	4	3	2	1	1	2	3	4	5	6	1	2	3	IG	OG	M	L		Inner	Outer
JULY	1	o	o	o	o	o	x	x	(x)	(x)	(x)	o	o	o	o	o	o	s	s		s	s	o	s	o	x	x
		o	o	o	o	o	o	o				o	o	o	o	o	o	o	o	o	s	o	o	o	o	o	o
	9	o	o	o	o	o	s	s	s	s	s	o	o	o	o	o	o	o	x	x	s	s	o	o	o	s	s
	11	o	o	o	o	s	x					o	o	o	o	o	o	s	s	s			o		o	s	s
	14	o	o	o	s	(s)						s	o	o	o	o	o						(s)		o	x	x
		o	o	o	s	x	(x)					x	o	o	o	o	o	?	?						o	o	x
	15	o	o	o	s	x						s	o	o	o	o	o	?	?	?			o		o	?	?
	16	o	o	o	o	o	s	s	x	(x)	(x)	o	o	o	o	o	o	o	s	s	s	s	o	o	o	s	s
		o	o	o	o	o	s	s	(s)	x		o	o	o	o	o	o	o	(s)	(s)	s	(s)	o	x	o	s	s
	20	o	o	o	(s)	x						x	o	o	o	o	o	x		x			x		o	x	x
	23	o	s	s	x	(x)						x	s	o	o	o	o						x		o	x	(x)
	25	o	s	s	x	(x)						x	s	o	o	o	o								o	x	(x)
		o	o	o	o	o	s	x	(x)	(x)	(x)	o	o	o	o	o	o	x	x	x			o	x	o	(s)	(s)
		o	o	o	o	s	s	x	x	x	x	o	o	o	o	o	o	x	x	x	x	x	o	x	o	(s)	(s)
AUGUST	2	o	o	s	(s)	x						x	x										x		o	(x)	x
	6	o	o	o	o	s	(s)	x	(x)	(x)	(x)	o	o	o	o	o	o	x	x	x			o	x	o	s	s
	11		x	x	x							?	?	?	?	?	?								?	?	?
	16	o	o	o	o	x	x	x	x	x	x	o	o	o	o	o	o	x	x	x	x	x	o	?	o	s	s
	17		(x)												(x)	x	(x)										
		o	x	x	(x)								(x)	x	(s)	(s)	(s)								(s)		
	18		(x)											(x)	x	x	x										
		o	x	x	x	x						x	x	x	s	s	s								s	x	x
	19	o	s	(s)	x	(x)						x	s	s	o	o	o						x		o	x	x
	24	x	x	x																							
	28	o	x	x	x	x	x					x	x	s	s	o	o								o		
			(x)													x											
			(x)												(x)	(x)	(x)										
		x	x	x	(x)	(x)							(x)	x	s	s	s								o		
SEPT.	10	o	x	x								x	x	x	(s)	s	o								o		
	11	x																							x		
	18		x	x	x											x											
			x	x								x															
	19	o															(x)										

KEY:

o = Old Feather
s = Feather missing or new sheath appearing
(s) = New feather emerging from sheath
x = New feather about half-grown
(x) = New feather nearly full-grown
No symbol = New feather fully extended

July 16 with primaries 1-5 in sheath in the right wing, and with 4-5 only in pin, 3 half-grown, and 1-2 practically finished in the right. The most striking instance was a 1st-summer ♂ on May 18 with primaries 6-7, all secondaries and the third greater covert new in the left wing and the inner greater coverts missing from the right, and median and lesser coverts new in both wings. This is the only instance of irregular spring molt in over 300 birds examined.

I have no note of the short tenth primary and alula in molt prior to August 1; being a minute feather, the tenth primary is nearly always complete before the ninth, and this and the alula have often finished when secondaries 5-7 are still half-grown. A ♂ with the tenth primary in pin on August 1 had this feather fully extended on August 4; the bastard-wing, partly extended on the first occasion, was by then complete. From August 17 and 18 we have occasionally trapped adults in which the change was complete, and most have finished by the end of the month. The very late records are almost certainly individuals which, through loss of an early clutch, have nested a second time. A ♂ which up to a week previously had attended flying young in the vicinity of one of the traps was caught on August 23 with the old primaries 7-10 remaining, the sixth in pin, and 1-5 not more than half-grown, a stage most birds have passed a month before. The tail was little more than half grown. One of the juveniles of this family, captured on August 29, had the body-molt only just begun on mantle, scapulars, sides of breast and flanks. By that date most of the year's birds have left the isle.

Occasionally birds on passage from farther north-west (Faeroe Islands, Iceland, Greenland) show signs of uncompleted molt, but this is normally confined to the ninth primary and innermost secondaries being a few millimeters short of their full length.

A final comment might be made on the severity of the molt in its early stages. It is highly improbable that birds in the condition described for early July could find an adequate supply of food for themselves and several nestlings or non-independent juveniles (which are attended for about 10 days after leaving the nest); and, as suggested above, it is probable that the onset is deferred until breeding is at an end. Nevertheless, the bird must have 7 or 8 clear weeks in which to prepare for the fall migration. The severity of wing and tail molt, combined with the lateness of the breeding season at Fair Isle and farther north, restricts the Wheatear to a single brood. Witherby *et al.* (1941) state that the species is double-brooded in Shetland as in parts of England, but the Venables (1955) and our own observations over the past 6 years show that this is not so. Furthermore, Witherby gives "double-brooded" for the Greenland race *leucorrhoa*, and Salomonsen (1951) quotes Fencker to the effect that a second brood can probably be reared in very mild years under ideal conditions. Nicholson (1930) in Greenland and Wynne-Edwards (1952) in Baffin Island have also suggested that *leucorrhoa* can be double-brooded. That any can breed twice, successfully, in the one season seems to me an exceedingly remote possibility; and there is nothing in the cases these authors give of presumed first-brood juveniles assisting to feed "second-brood" nestlings which is inconsistent with the more likely alternative that independent juveniles, attracted out of curiosity, were taking a sporadic part in

"helping" a late-nesting pair. Nicholson's paper lays stress on their inquisitiveness, and at Fair Isle we have watched young Wheatears showing keen interest in a nestful of Twites; the fact that in his case the "helpers" were in different stages of molt to first-winter plumage, and thus almost certainly of different ages, supports this alternative.

SUMMARY

The progress of the complete post-nuptial molt in the Wheatear *(Oenanthe oenanthe)* is described from examination of over 80 specimens trapped at Fair Isle Bird Observatory.

Molt commences in late June, unless delayed by late nesting, and occupies 7-8 weeks, finishing in the third week of August.

Juveniles molt the contour feathers, median and occasionally some greater and lesser coverts when between 5-8 weeks old.

Wing and tail molt are very severe in the early stages, and the birds inactive. The few weight records from "repeat" trappings suggest a gain on normal weight at the onset and a slight loss towards the end of the period.

The severity of wing and tail molt restricts the Wheatear to a single brood at Fair Isle and farther north (Faeroe Islands, Iceland, Greenland).

REFERENCES

NICHOLSON, E. M. 1930. Field-notes on Greenland Birds. *Ibis* (1930): 280-313.
SALOMONSEN, F. 1951. Grønlands Fugle. (The birds of Greenland.) Vol. 3. Copenhagen.
VENABLES, L. S. V. and U. M. 1955. Birds and mammals of Shetland. Edinburgh.
WITHERBY, H. F. *et al.* 1941. The handbook of British birds. Vol. 2. London.
WYNNE-EDWARDS, V. C. 1952. Zoology of the Baird expedition (1950). 1. The birds observed in central and southeast Baffin Island. *Auk*, **69**: 353-391.

17 India St., Edinburgh, Scotland.

SOME TUFTED TITMOUSE LIFE HISTORY

BY AMELIA R. LASKEY

The Tufted Titmouse *(Parus bicolor)* is a common permanent resident in Tennessee, particularly in wooded areas. They are regular visitors at feeding stations in many residence sections of Nashville from early autumn until spring if sunflower seeds, nutmeats, peanut butter or suet are provided. Most of them go to the woods in spring to nest. They often return to my home banding station in May, June or July, bringing their nearly mature fledglings.

AGE

From 1931 to 1956, I have banding records for 327 individuals at my home and substations in the south-western section of Nashville. As this species enters banding traps rather freely, it is possible to gather

data on their life span. At the present time, 309 individuals, the number banded to the end of 1954, could have remained at the station for 2 years or more. I find that 25 Tufted Titmice did so (8 percent); 13 remained about 2 years, 7 for 3 years, one for 4½ years, 3 for 5 years, and one for 6 years, 3 months. The exact age for the latter is known. He was banded No. 42-109431 as a nestling, hatched April 21, 1948, and was last seen on July 19, 1954. Middleton (1949) in Pennsylvania reported a Tufted Titmouse banded on January 7, 1939 which remained to nest in one of his boxes each year and was captured for the last time on September 15, 1945 at 7 1/3 years of age.

HABITS

Rather rarely one of the residents will remain at my home to nest in a box and occasionally a pair has occupied one of the boxes placed in Warner Parks for Bluebirds *(Sialia sialis)* or attempted to use a tin cylinder newspaper box on the roadside. Usually a natural cavity in a tree or fence-post is preferred. Because these natural cavities are often inaccessible for watching, there is a paucity of published data on the nesting of this species. Therefore I am summarizing some general observations on behavior and nesting in the Nashville area. In addition, data were obtained from 93 hours of watching the incubation and nestling periods of an entirely successful brood of seven young, one of them being the previously mentioned No. 42-109431, called "Lefty" because he was banded on the left tarsus.

In the non-breeding season, Tufted Titmice are social, flying and feeding amicably together in twosomes, in groups and in association with the closely related Carolina Chickadee *(Parus carolinensis)*. My records of distinctively marked individuals indicate that the twosomes may be a mated pair, but not always. They may be birds hatched the previous summer, probably of the same brood, or a parent and a youngster. The small groups may be a family or a brood. I have not seen large groups. One color-banded pair and their son remained together for the entire winter. At times mother and son came to the feeder together. Van Tyne (1948) had two marked young come to his feeding shelf with their parents until November 8, 1942 and after that date, one young continued to come with them until January 10, 1943.

Often when one Tufted Titmouse was trapped, a companion remained nearby, using a rasping vocal sound, while the entrapped bird was being handled, accompanying it when released. Gillespie (1930, p. 122) mentions this habit. On April 21, when nesting must have been in progress, the actions of one of a pair, in a threatening type of posture, suggested a sort of distraction display. As usual this bird used the rasping notes as I handled the mate, but instead of flying off with it, this one flew within ten feet of me, faced me on the ground and displayed by crouching with spread wings, thrusting head forward and rasping. Odum (1941, p. 531) describes a somewhat similar, but more exaggerated display by the Black-capped Chickadee *(Parus atricapillus)* when he caught their newly-fledged young.

In winter Tufted Titmice frequently store food or attempt to do so. In October, 1955, one tucked a shelled sunflower seed into a crevice of the bark of a silver maple tree; a squirrel immediately attempted to extract it. In December, 1940, one searched among the English ivy vines on a tree trunk for a place to hide the seed it was carrying. In January, 1944, one gathered bits of bread, flew to a clump of plants, hopped all around the clump, looking into it, but finally dropped the food on the frozen ground. On another occasion, I watched a Carolina Chickadee hiding hulled sunflower seeds in tree-bark crevices, but each time that the chickadee went after another seed, a Tufted Titmouse helped itself to the stored kernel. In Kentucky, Helen and Paul Owen (1956), report Tufted Titmice pushing sunflower seeds deeply into the sod on October 12, but did not see them attempting to recover them later.

BATHING

I have not seen a Tufted Titmouse bathe except in spray from the garden hose. In July, 1954, four fledglings, still being fed, but near independence, had a great frolic bathing in the spray in the garden, but were not joined by their parents.

On June 22, 1948, a hot, humid day, an immature titmouse, about two months old, sprawled on the house roof for a brief sun bath.

SONG AND FEEDING OF THE FEMALE

Immature Tufted Titmice sing lengthy formless songs as do many other juvenile birds. On September 10, 1944, I heard one singing that type which I would not have recognized except for the occasional *peto* notes interspersed within the medley. On July 19, 1954 when Lefty and his mate brought their four large young, these fledglings sang the formless song, but did not use any *peto* notes.

After a period of silence or infrequent song in winter, the voice of the Tufted Titmouse is usually heard by mid-January in loud *peto, peto, peto,* or *peo, peo, peo* or a rapidly uttered *p, p, p,* most persistently by male when calling for a mate. By February and March, a sibilant *sweet, sweet* or *see, see* or *see-bee* (similar to a Carolina Chickadee song) is used also. These sibilant notes are heard mainly when a pair is together sometimes as they feed together or when the male calls his mate to give her food that he holds in his bill. The male of the 1948 nesting pair used the loud *peto* from a distance to call his incubating mate from the nest for food. If she had not joined him, he came closer to the nest and used the soft sibilant notes to call her off. After the young hatched when he no longer fed the female, he announced his arrival in the vicinity of the nest with a harsh rasping call, occasionally with a *peto* note.

The courtship feeding behavior starts in March before incubation, but is more commonly observed in April during nest-building, egg-laying and incubation. The female assumes the begging posture of a juvenile to receive the food, crouching and quivering her wings, using soft sibilant notes. Hinde (1952, pp. 90-96) describes this "wing-shivering" display for several Paridae in Europe as a part of courtship feeding and copulatory behavior. The pair that nested near our house

quivered their wings as they met near the nest as each carried larvae for their nestlings. The female did this much oftener than the male, but on April 19, two days before the eggs began to hatch, the male quivered his wings before feeding his mate. He did this again when they met on April 21 and April 25 as they both approached the nest with food for the nestlings. On April 28 when the young were six and seven days old, the pair quivered wings as they met. Throughout the nestling period, the female was seen quivering her wings many times when she saw her mate, but he never passed any food to her after the young were hatched. Odum (1941, pp. 526-527) says that only rarely has he seen the male Black-capped Chickadee feed the female away from the nest after the young have hatched; he ignores her and feeds the young, but wing-fluttering may still take place.

Sometimes early in spring the intention of the male Tufted Titmouse to feed the female is not consummated. On March 10, 1950, Lefty and his mate were perched on a feeder, when the father of this two-year-old male arrived. The female flew. Lefty flew at his father, Blue, driving him away (I never saw Blue again). Lefty then returned to the feeding shelf, picked up a seed, calling *see, see* many times. The other bird did not reappear so he flew to another perch to eat the seed himself. Another March feeding attempt was thwarted by an interruption; the male called with a seed in his bill, but the female did not appear. On March 26, 1955, one fed his mate on the ground and while perched in trees. Brackbill (1949) observed courtship feeding in Maryland before the incubation patch had developed.

During the first part of the incubation period, female Red missed several feedings brought by her mate, Blue, to the vicinity of the nest. Sometimes she was absent; other times she did not respond to his *peto* or sibilant calls and remained on the nest. Previous to the 8th day of incubation, I did not see him go to the nest-box with food, but on April 16th, he began to deliver it to her at the entrance if she did not leave the nest to meet him on a nearby twig.

NESTING

Between 1939 and 1955, I have obtained some data on two nests in natural cavities, six in nest-boxes and one in a tin newspaper box at the roadside. Clutches consisted of 5 to 7 eggs. Many books (including Bent, 1946) state that the Tufted Titmouse lays 4 to 8 eggs; Butler (1897, p. 1134) states 5-6, sometimes as many as 9. The only cited record of 8, found in available literature, is one in the Cleveland, Ohio region. Williams (1950, p. 102) states: "June 27, family of 8 leaving the nest." For the Plain Titmouse *(Baeolophus inornatus)*, Price (1936) records 3 to 9 eggs in 62 clutches laid in nest-boxes in California, with 7 egg sets predominating (17 nests). My findings in Nashville agree with those of Wayne for the Tufted Titmouse in South Carolina (1910, p. 194) who found 5 to 7 eggs in a set. In Nashville, I found 3 sets of 5 eggs; 3 sets of 6 eggs, plus one found with 6 young in a natural cavity; 3 sets of 7 eggs. One set of 5 eggs all hatched, but the young disappeared by the 13th day, the other two sets produced 3 fledglings each. One of the 6-egg sets produced 5 young, the one

in the newspaper box was deserted, and the one in a natural cavity was not followed after hatching. Of the 7-egg sets, one was taken by a predator, one set was sterile and was collected on the 18th day when the female was still incubating. The third set was entirely successful. From the 7 nests where all data are known, 18 young fledged from 43 eggs (42 percent success). Middleton (1949) reports that No. 39-126650, the old bird that nested for 7 years in a box at his home in Pennsylvania, with its mates produced 47 young. He does not state the number of eggs laid, but reports all nests successful with 3 to 7 young in a brood. This bird was mated with No. 39-126609 in 1940-41-42 and for the next three years with No. 40-137944. In 1941 there were two broods (5 and 3) and in 1945, two broods (7 and 5 young). No known second broods are on record in Nashville. Wayne (1910) states that the Tufted Titmouse is single brooded in South Carolina.

The nests built in boxes were usually about 5 feet from the ground, one was 7½ feet. Those in natural cavities were 5½ to 7 feet from the ground. H. C. Monk has given me some data on nests in natural cavities in the Nashville region; one in a gum tree was 18 inches above ground, another in a hackberry tree was 20 feet. On April 15, it held 4 fresh eggs which were cold to the touch that night about 8:00 p.m. although the bird was in the cavity and attacked his hand. Apparently the set was incomplete and incubation had not started.

In addition to green moss, grass, leaves, vegetal matter and string used in the body of the nest, I have often found snake skin or scales. Wayne (1910) mentions the presence of snake skins in the nests he found in South Carolina. He also describes a very unusual nest built in Spanish moss seen on April 23, but the following day after a storm, he found the 5 eggs on the ground. The female began to build in the same mass of moss although the male appeared to be trying to interest her in a nearby cavity by flying to it and calling to her. By May 3, she had completed the second nest and laid 3 eggs, but the following day, that nest also was blown down.

Butler (1897, p. 1136) cites a record of another unusual nest near Cincinnati, Ohio in May. Six nearly hatched eggs were found in a hole excavated in the side of an old, rough nest of a large bird in the top of a tall sapling.

During egg-laying, it is customary for the female Tufted Titmouse, like the Carolina Chickadee, to cover the incomplete set with nest lining material when she leaves the nest. Nests are usually lined with soft fibers or mammal hair, sometimes sheep wool. This habit tends to protect the eggs as it gives the impression of an incomplete nest. I have never found the eggs of either species covered after incubation has started.

In 1948, the resident pair of Tufted Titmice built in a box fastened to a tree trunk about 7½ feet from the ground, some twenty feet from our windows. Their nest was a few feet from an ivy-covered hackberry tree where a pair of Blue Jays *(Cyanocitta cristata)* had their nest. Between the two nests was a small elm tree which was used as a perch by the Blue Jays and the Tufted Titmice.

The male had been banded as an immature (first year) bird on July 29, 1947, called "Blue" from the plastic band he wore. His mate,

"Red," was banded on March 25, 1948. Nest-building was first noticed on March 24 when a layer of green moss covered the bottom of the box. Upon the thick layer of moss was a layer of dry leaf fragments. The depression was lined with 1½ inches of soft material, including vegetal fibers, narrow strips of paper, rabbit and opossum hair. I was unable to watch closely enough to learn which of this pair carried the nest material, but among other Paridae, the female builds the nest (Odum, 1942, p. 524; Hinde, 1952, p. 7). The 7 eggs were laid from April 2 to 8 and were covered each day with nest material until incubation started at the completion of the set. The female alone incubated. I did not go to her nest while she was in the box, but with other incubating Tufted Titmice, I found several that would not leave the nest when I opened the top. At least three incubating birds allowed me to lift them from their eggs, band them and replace them on the eggs. Most of the Tufted Titmice that I observed nesting, hissed, sputtered and lunged forward as I looked into the nest or put my hand near the incubating bird. One of them began to peck the side of the box after hissing. I have noted this hissing and lunging behavior in the Carolina Chickadee which in my experience is even more explosive in her demonstration. Observers have found this behavior in other *Paridae*. Hinde (1952) and Sibley (1955) discuss this habit which in many ways appears imitative of the actions of a snake. Sibley observed a Plain Titmouse a number of times and says: "The entire pattern of swaying movement and hissing sound was strongly suggestive of a snake and undeniably startling." "It is not difficult to believe that potential predators would frequently be frightened by this activity."

INCUBATION

Although incubation of the 1948 nest started on April 8, I was unable to make lengthy observations until the third day, April 11. The female continued to bring bits of fiber or mammal hair to add to the nest lining at least once during each observation period until April 18, the 10th day of incubation.

As her periods on the nest were long and I was unable to watch continuously, my records show a large number of incomplete periods, most of which are omitted in the following tabulation of attentive and inattentive periods. The attentive periods (on the nest) range from 18 to 73 minutes, with the shorter periods occurring in the latter part of the incubation. The average attentive period was 39 minutes.

The periods off the nest range from 3 to 51 minutes. This one unusually long absence of 51 minutes occurred on April 12 when the day was unusually warm with a mean temperature of 78 degrees, 20 degrees above normal. The average for inattentive periods was 18 minutes.

In the following list, the periods in parenthesis represent those off the nest: April 11, (p.m.) + 61(19); April 12 (p.m.), + 66(51); April 13, (32)42(20)50(3); April 14, (7)40(12)73, 52(19)44(10); April 16, (13)66(18)55(25)32(17); April 17, 28(3)30, 17(17)-36(16); April 18, (19)27(10)26(23)29(24); April 19, (25)38-(24)18(31). For the Black-capped Chickadee, Odum (1941, p. 523)

found the average attentive period to be 24 minutes and average inattentive period 7.8 minutes.

NESTLING PERIOD

On April 21, the 13th day of incubation, young were hatching. At 5:35 a.m. C.S.T. 5 had hatched. As I looked into the nest-box, the female sat on the nest with half an egg shell in her bill. She gave a hissing note and lunged toward me, throwing the egg shell to the nest rim. She flew off the nest and soon afterward returned with a larva in her bill. I was still near the nest; she hopped about in a near-by tree as if shy of me, then swallowed the food herself.

I went indoors and the pair continued to bring food to the young. As the male had been going to the nest with food for the female, he was doubtless well aware when the young were hatching. Sometime between 10:30 a.m. and 4:00 p.m., the sixth egg hatched. The female went into the box at 5:23 p.m., 63 minutes before sunset. The seventh egg hatched sometime before the next day.

She brooded much of that morning, but after that, I failed to find her on the nest at any time during the day until toward evening when she went on for the night. After May 4, when the young were 12 and 13 days old, she ceased night brooding, leaving the young unattended for the last four nights in the nest. Table 1 shows when the female went into the nest to brood:

	Temp.	Type of day	Min. before sunset
April 21	72	Partly cloudy	63
24	81	clear	5
26	78	cloudy	27
27	83	mostly fair	28
28	67	partly cloudy	26
29	69	clear	25
May 1	78	cloudy	9
3	80	showery	15
4	67	showery	24

Three days before the young fledged, the male fed bread at least twice, and pecan bits whenever he could find them on the feeding shelf.

When the male discontinued passing food to the female after the young hatched, there was a definite change in his vocal notes. Instead of the loud *peto* from a distance or the sibilant soft note when near the nest, he used a harsh rasping note most of the time as he perched on a twig a few feet from the nest before delivering the food to the young. He became more excitable, sometimes rasping for several minutes at a time. This was particularly noticeable when he met the Blue Jays; previously he had usually watched them in silence. He had resented the presence of a pair of Cardinals *(Richmondena cardinalis)* during the incubation period, flying at them. This belligerence continued; he flew at a Myrtle Warbler *(Dendroica coronata)* that he met near the nest; he scolded squirrels, a chipmunk, a Purple Grackle *(Quiscalus quiscula)* and me. May 1, he perched near a male Cowbird *(Molothrus ater)*, merely watching him. On May 5, he rasped excitedly for long intervals at a chipmunk on the ground, then he beat

the larva that he held in his bill against a branch. In the many times that I had watched him approach with food, I had never seen him do this before and thought that it might be a substitute activity in venting upon the larva the fury that he felt toward the chipmunk.

On April 25, the female Tufted Titmouse flew hissing at a Starling *(Sturnus vulgaris)*, but she usually ignored other birds.

The rate of feeding showed an increase from 7 per hour on April 23 to an average of 24 per hour on May 8, the last day of nest-life. An acceleration in the rate of feeding was also noted from the mid or late morning hours into the afternoon. The slowest rates occurred in early morning and late in the day. Although it was not possible to identify each bird as it brought food because they often arrived and departed so swiftly, the male definitely assumed the greater share of providing food.

On four mornings during the nestling period, I learned when the female left the nest: April 28 at sunrise; April 30 at 5 minutes after sunrise; May 1 at 7 minutes after and May 5 at 10 minutes after sunrise. First feedings of the morning were brought on three mornings between April 26 and May 5 by the male at 6 to 9 minutes after sunrise and on May 6 by the pair at 12 minutes after sunrise, the female delivering her larva first (she had not brooded the previous night).

Final feedings for the day were noted on 12 evenings. On April 24 (young 2 and 3 days old) the male fed 9 minutes before sunset; on April 28, the female brought a meal as she went into the box to brood for the night at 28 minutes before sunset. Ten minutes later, the male arrived with food, looked into the box, then flew with the larva to a near-by tree, swallowed it, wiped his bill and flew. On six evenings thereafter (to May 4) the male brought the final meals at 30, 14, 22, 17, 32, 41 minutes before sunset. On the next four evenings, the female did not brood. She and her mate brought the late meals on alternate evenings at 30, 29, 15 and 44 minutes before sunset. During the May nestling period, there was considerable cloudiness and light showers almost daily.

Wight (1934) in Chattanooga, Tennessee, reported that after a brood was raised in one of his nest-boxes, the parents (apparently unmarked for identification) returned for a second nesting and were assisted in the feeding of this second brood by one and sometimes two others which he belived were young of the first brood.

On April 30, I banded the seven nestlings then 8-9 days old. The primaries and rectrices were unsheathed about 3 millimeters; eyes were not open to full roundness. All were quiet when handled and did not cower. On May 1, their voices could be heard at some distance. By May 5, they crouched with lowered heads as I looked into the nest. They were well feathered with tails about 7 mm. long. They had become very vociferous when the parents arrived with food. On this date, I watched the nest for 3½ hours (7:00 to 9:00 a.m., 11:30 to 12:30, 5:30 to 6:00 p.m.) when the parents brought an average of 15 meals per hour. Mrs. Nice (1931, p. 132) watched a brood of 5 well-feathered Tufted Titmice in Oklahoma on June 6, 1926 when 18 meals were fed from 2:00 to 4:00 p.m. The female brooded 3 and 8

minutes. The following day from 10:40 to 12:10, they received 7 meals in 1½ hours and she brooded 8 and 15 minutes.

During my watch periods, the male was more active in nest sanitation; he removed 14 sacs and the female 7.

On May 8, a nestling often poked its head out of the entrance, using the sibilant *su-wet* or *su-wet-tet* notes; the adults called *peto* oftener from a distance. They sometimes came to the box without food. It was evident that it was about time for the nestlings to leave, but all of that day they hesitated and the seven were still in the nest when night came. But they were off and away before 6 o'clock the following morning without my seeing them leave. They were 17 to 18 days of age.

WEIGHTS

After a 9-day absence, the family returned on May 18. On June 1, two of the fledglings entered a banding trap. One weighed 20 grams, the other 20.6 grams. On July 1, one of the brood, Lefty, entered a trap. He weighed 22.4 grams. On September 1, he and his mother were both in traps at 8:00 a.m. He weighed 23.3 grams and she weighed 19.1 grams.

Fourteen Tufted Titmice, known to be at least a year old, have been weighed at my station. They averaged 20.5 grams, ranging from 18.6 to 22.3 grams.

LEFTY, HIS MATES AND YOUNG

Lefty followed the usual pattern of the species at my station. In April, 1949, he was feeding "Orange," a newcomer banded that month. He had spent the winter with his parents, Blue and Red, but Red, his mother, had disappeared in early spring of 1949. Blue soon obtained a new mate, "Green." Both pairs left, doubtless to nest elsewhere. In September, 1949, Lefty, Blue and Green returned, but the latter disappeared soon afterward. Lefty and Blue frequented the banding station all winter, Blue disappeared in March and Lefty went away later that spring (1950) but returned July 7 with a full-grown fledgling that associated with him through that autumn and the winter of 1950-51. Lefty was often seen in spring of 1951, but his mate was never identified as any of the residents or visitors at my station. On June 21, 1951, Lefty was feeding a large fledgling which was soon banded and remained until the latter part of January 1952. After March of 1952, Lefty was not seen until November, 1952, although a brood of young appeared in June. He again spent the winter at the station (1952-53), left in spring, returning in September, 1953, for the winter. In the spring of 1954, his mate was a yearling, banded in July, 1953. As usual, they disappeared in spring, returning June 6, both entering banding traps. On July 19, 1954, they brought their four large fledglings which were still dependent. A few days afterward, all of the young were trapped and banded. Lefty was not seen again.

SUMMARY

This study includes observations on habits and nesting of the Tufted Titmouse *(Parus bicolor)*, a permanent resident of Nashville, Tennessee, which usually nests in natural cavities in woods, occasionally in a nest-box. It frequents feeding stations at homes in the non-breeding season.

From 1931 to 1956, 327 individuals were banded in my home area. Of these, 13 remained for 2 years, 7 for 3 years, one for 4½ years, 3 for 5 years and one male, banded as a nestling, for 6 years and 3 months.

In winter, they are social, associating in twosomes, in small groups and with Carolina Chickadees. The twosomes may be a mated pair, a parent and young, or two immature birds. Small groups may be parents and young or young of the previous season.

In fall and winter, Tufted Titmice hide seeds or other food in crevices or in the ground.

Juveniles have a lengthy formless song unlike adult song; later in the summer season, *peto* songs are interspersed in the medley. By mid-January adult songs, *peto* and variations of it, are commonly heard. These are used in mate-calling. Courtship feeding usually starts in March previous to nest-building. The male uses a sibilant *see, see* call to the female and she assumes the begging posture similar to a dependent fledgling to solicit or receive the feeding.

In 9 nests, there were 3 sets of 5 eggs, 3 sets of 6 eggs, and 3 sets of 7 eggs. From 7 nests where all data are known, 18 young fledged from 43 eggs, 42 percent successful.

A nest in a box at my home was watched closely during incubation and nestling periods. The set of 7 eggs was laid April 2 to 8. The female alone incubated. Her mate brought food to her to the end of the incubation period, April 20, but not on or after April 21 when the young were hatching. Both parents fed the nestlings, mainly larvae, but the male assumed the greater share of feeding and nest sanitation.

The periods on the nest ranged from 18 to 73 minutes, averaging 39 minutes. The shorter periods occurred in the latter part of the 13-14-day incubation period. Inattentive periods ranged from 3 to 51 minutes, averaging 18 minutes. This single long period of 51 minutes occurred on April 12 when the mean temperature was 20 degrees above normal.

Hatching of the 7 eggs required about 24 hours (April 21-22). After the first day that all were hatched, the female did not brood until she went into the nest for the night at 5 to 63 minutes before sunset (usually about 25 minutes). She did not brood on the last 4 nights.

The 7 fledglings left very early on May 9 when they were 17 to 18 days old. After a 9-day absence, they returned with their parents to my banding station; later 3 of the brood entered banding traps, including the one called Lefty.

Lefty spent the winter with his parents at my banding station. His mother disappeared in early spring, but the following winter, Lefty, with his father, was back. Lefty disappeared each spring for nesting, usually returning in summer with one or more fledglings. Sometimes one of his fledglings spent the winter with him. Lefty spent six winters at my home banding station.

ACKNOWLEDGMENT

I am indebted to Dr. Margaret M. Nice for reading of the manuscript and for helpful suggestions.

REFERENCES

BENT, ARTHUR CLEVELAND. 1946. Life Histories of N. A. Jays, Crows, and Titmice. Smithsonian Inst., Washington, D. C.
BRACKBILL, HERVEY. 1949. Courtship Feeding by the Carolina Chickadee and Tufted Titmouse. *Auk*, **66**: 290-292.
BUTLER, A. W. 1897. Birds of Indiana, Dept. of Geology and Natural Resources, Indianapolis.
GILLESPIE, MABEL. 1930. Behavior and Local Distribution of Tufted Titmice in Winter and Spring. *Bird-Banding*, **1**: 113-127.
HINDE, R. A. 1952. The Behavior of the Great Tit (Parus Major) and Some Other Related Species. 201 pp. E. J. Brill, Leiden.
MIDDLETON, RAYMOND J. 1949. Tufted Titmouse Nesting Seven Years. *Bird-Banding*, **20**: 15-16.
NICE, MARGARET M. 1931. Birds of Oklahoma. Univ. of Norman Press, Norman.
ODUM, EUGENE P. 1941. Annual Cycle of the Black-capped Chickadee. *Auk*, **58**: 314-333.
——— 1942. *Auk*, **59**: 499-531.
OWEN, HELEN AND PAUL. 1956. Tufted Titmice Burying Sunflower Seeds. *Ky. Warbler*, **32**: 62.
PRICE, JOHN B. 1936. The Family Relations of the Plain Titmouse. *Condor*, **38**: 23-28.
SIBLEY, CHARLES G. 1955. Behavioral Mimicry in the Titmice (Paridae) and Certain Other Birds. *Wilson Bull.*, **67**: 128-132.
VAN TYNE, JOSSELYN. 1948. Home Range and Duration of Family Ties in the Tufted Titmouse. *Wilson Bull.*, **60**: 121.
WAYNE, ARTHUR T. 1910. Birds of South Carolina. Daggett Prtg. Co., Charleston.
WIGHT, E. MEL. 1934. Attracting Birds at Chattanooga. *Migrant*, **5**: 46.
WILLIAMS, ARTHUR B. 1950. Birds of the Cleveland Region.

1521 Graybar Lane, Nashville, Tennessee.

CHANGES IN SEX RATIO OCCURRING WITH AGE IN YOUNG CALIFORNIA QUAIL IN CENTRAL OTAGO, NEW ZEALAND

BY G. R. WILLIAMS

Studies on population dynamics of California quail in various parts of New Zealand (where they were introduced in 1862—Williams 1952) have been proceeding for some years now. One aspect of the work that will be of interest because of a number of recent articles (Hickey 1955, Campbell and Lee 1956, Rosene and Fitch 1956, Wallmo 1956) is that of changes in the sex ratio of this species that occur with advancing age.

First of all, it is well known that the sexes can be distinguished at an age of six to seven weeks; secondly, I have found—as will appear elsewhere—that young birds may be aged with fair accuracy (to within about three to four days either way from the true date of hatching) up to an age of about 22 weeks by means of the progress of the primary wing molt

(though the molt, or rather the growth of the 8th primary, is not absolutely complete until 25 weeks). Such a method has already been described for bobwhite quail by Petrides and Nestler (1943, 1952), and Thomson and Kabat (1950), for the scaled quail by Wallmo (1956), and recently, for the California quail in California by Genelly (1955). Thirdly, birds one year of age or more may, of course, be readily distinguished from immatures by their possession of unmottled upper primary coverts.

Incidentally, it seems timely to suggest a clear and systematic way of referring to the different age components in the population of the various species of quail and, perhaps, other game birds for that matter. Thus: *Chicks*—those that have not yet begun to undergo the first primary wing molt, *juveniles*—those in which the first primary wing molt is in progress, *immatures*—those that have completed this molt, and *adults*—those that have undergone a general post-nuptial molt. In the case of the species of quail already mentioned, the *approximate* ages in each group will be respectively—0-4 weeks, 4-25 weeks, 25 weeks to 12 months and 12 months or more. In these same species—and most others—primaries IX and X are usually retained during the first year.

This paper is confined almost entirely to a discussion of sex ratio changes in a quail population that has been sampled by trapping and banding only. Another method of sampling is by shooting, but this will be discussed more fully elsewhere.

All birds trapped and banded are sexed, aged (accurately if they are juveniles), and weighed, the last, among other things, being a useful check on the ageing. To reduce errors in what follows, no sexings in birds of less than six weeks have been accepted for it is felt that the state of the molt in these categories may be such as to cause appreciable errors in the sexings of males, resulting in their being classed as females. At present there are not sufficient numbers in some of the weekly age groups to allow reliable comparisons to be made between them individually; therefore, a certain amount of "lumping" has had to be done, as may be seen from the table. Furthermore, to reduce any bias that may arise because of the development of a "trap habit" only birds trapped *once* have been used in the calculations. In a two-year study the following distributions were obtained:

	1955			1956			1955 & 1956		
AGE GROUP	♂	♀	% ♂	♂	♀	% ♂	♂	♀	% ♂
6- 9 weeks	5	6	45.4	9	30	23.1	14	36	28.0
10-13 weeks	18	35	33.0	44	75	37.0	62	110	36.1
14-17 weeks	45	36	55.5	58	51	53.2	103	87	54.0
18+ weeks	7	5	58.3	17	13	56.7	24	18	57.2
Adults	91	49	65.1	101	58	63.6	192	107	64.0

(Ages among the juveniles are taken to the nearest week)

With one minor exception, clear and approximately parallel trends occur for each year, and although the samples within each particular group are not always as large as one would like, the fact that similar trends *are* nevertheless obtained is reassuring as far as their general reliability is concerned. An X^2 test, using the juveniles only, shows that there is an association between the sex ratio and the age, significant

at about the 0.001% level. However, future work may show that the figures so far obtained may need some adjustment; the earlier part of the trend seems remarkably steep. But, even if the first age group (wherein sexing errors are most likely to arise) is eliminated from our consideration, a clear trend is still apparent. It should, perhaps, be mentioned here that in the 18+ weeks group the time of trapping (approximately 10 to 18 weeks after the peak hatching period in early December) ensures that very few birds are older than about 25 weeks.

For this particular area (mainly the Poison Creek Field Experimental Station in Central Otago, South Island), it is unfortunate that there are insufficient figures from trapping and banding operations to allow of the inclusion of another age group (i.e. *immatures*) between the 18+ week class and the adults, for it would be comforting to find a figure intermediate in value between 57.2% and 64.0% for it. However, information *is* available for a late-immature group but it has been obtained from the results of trapping over a much wider area in Central Otago for a number of years. The percentage of males calculated from these data (the mean age of the birds being 6-7 months) is found to be 48.6 (118/244) but this is not significantly different by X^2 test from the 1955-1956 figures for the 18+ week group. Nor are either of these percentages significantly different from that found for the same late-immature age group by calculation from *shooting diary* returns from Central Otago over the last 8 years (51.2%: 2014/3933). Since, at the 95% level, the confidence limits for the 18+ week group at Poison Creek lie between 41% and 71% males, the suggestion made earlier that the Poison Creek figures at present available may exaggerate the real trend is not inconsistent with the results of the statistical analysis so far. Furthermore, because the figures for the 18+ week group are not significantly different from those obtained for birds in the late-immature group some three months later, it appears that the major difference between the sexes in mortality among young birds has disappeared by then.

Admittedly the following explanations may be offered to account for the trend just described: (i) it results from a difference in the tendency of each sex to enter the traps; or (ii) it is merely a measure of the certainty of correctly identifying the sexes as the birds grow older. Let us take each of these in turn for discussion:

Any argument that maintains that there is a sex difference in "trapability" must postulate a gradual reversal of its expression—males becoming less wary as they grow older and females more so. It must also account for the fact that both shooting and trapping yield the same late-immature and adult sex ratios. That two different methods of sampling are biased in the same direction to the same degree is no doubt possible but rather unlikely. The simplest hypothesis seems the best: both shooting and trapping can give a reliable sample of the population as a whole—a point of view reached intuitively by Emlen (1940), for the California quail in California, and by Stoddard (1931) for the bobwhite. Besides, the method of trapping is such that a sex difference in "trapability," should it exist at all, seems likely to exert very little influence: there is no evidence that parties predominantly

of one sex are formed at the ages with which we are mainly concerned, and the traps themselves are essentially shallow rectangular wire nets four feet or more square which, when set, have only one side in contact with the ground and so may be readily approached from three sides. There are no narrow entrances. To reduce wariness food is laid about the traps and they are left propped up for three or more days before the automatic tripping device is set. (In many cases when statistical analysis has shown there to be a trap bias of some kind—see, for example, the elegant analysis by Leslie, Chitty & Chitty, 1953—the traps used have a restricted entrance.)

As for incorrectly identifying the sexes, the only group in which this might be an appreciable source of error is that including birds 6-9 weeks of age. However, even with this group disregarded, the trend among the young birds is still quite clear (and significant at the 0.001% level). Sexing errors in the one direction (males wrongly classified as females) of about 25% and 15% respectively would be needed in the first two age groups in the table to upset the trend which is apparent there. There is no evidence, so far, that errors of such magnitude are being made; in fact, an examination of the records available at present of birds within these groups that have been retrapped or shot indicate that any such error is less than 5%.

Measurements of apparent differences in mortality rates between the sexes in young birds such as I have described in this paper seem to have been made only rarely on wild populations of other birds, no doubt because of the general difficulty in accurately ageing and sexing the juveniles of most bird species. What is usually reported is no more than a comparison of the sex ratios between birds of the year *as a whole* and adults (c.f. for species of quail: Stoddard 1931, Emlen 1940, Leopold 1945, Lehmann 1946, Hickey 1955, and Campbell & Lee 1956). If figures for *all* birds trapped in Central Otago over a number of years are compared in this way we get a result similar to those given by the authors just cited, but our analysis of one segment of the juvenile and immature group has shown that there seems to be an age/sex structure within it that had not previously been suspected. Earlier explanations of the cause of the discrepancy between the two groups as a whole had suggested that an approximately equal sex ratio at hatching is upset once breeding age is reached, and females begin to suffer greater stresses and risks than males. It now appears, in California quail at least, that an imbalance between the sexes may appear long before the birds reach breeding age and even before the population is subjected to the mortality exerted by shooting. The risks and stresses attendant upon breeding activity may then accentuate this imbalance. In other species of quail the odd occasion when a sex ratio among the young birds *as a whole* favoured females was regarded as anomalous and due to improper sampling (c.f. Campbell & Lee 1956), but whether or not females will predominate in such a group may depend upon the time of year at which the population was sampled; for example, in our table only 203 of the 454 juveniles are males, that is, 44.7%.

A rather interesting fact emerges if a comparison is made between the *adult* sex ratios given for California quail and bobwhite quail in Table No. 8 in Hickey (1955), those given for Gambel's and scaled quail in Campbell & Lee (1956) and California quail in this paper: The value of X^2 in a 2x9 contingency table is 11.148 which indicates that the ratios are not significantly different from each other. Thus, in these quail the *adult* sex ratio seems remarkably insensitive to variation in species or locality, and has a value of approximately 62:38 in favour of males. A similar result emerges when an analysis is made of the sex ratios among *immature* birds using Hickey's table for California quail and bobwhite and the figures given in this paper for late-immatures from Central Otago obtained by trapping and by shooting over a number of years. Campbell & Lee's figures for Gambel's and scaled quail were not included as their "young-adults" include birds up to about 18 months old. In a contingency table the value for X^2 was found to be 5.81 which is not significant for 7 degrees of freedom, and the value of the ratio is approximately 51:49 also in favour of males.

If the trend that has been demonstrated is real and of fairly general application, it poses some rather interesting questions: For example, what is the true sex ratio in California quail at hatching? If it is unity at fertilization, is there a greater mortality among males *in ovo* or does it occur between hatching and an age of about six weeks, to be followed by a period in which males have a better survival rate, comparatively, than females for a time until an equilibrium is reached some time late in what is usually called the "postjuvenile" moult? The last seems the most likely explanation, but there is no way of being sure at present. Of course, the preponderance of females in the earliest age groups may, in reality, prove to be far smaller than the available figures suggest. *In proof:* Results for 1957 have just been analysed. When added to those already given for 1955 plus 1956 the result is to decrease the steepness in the trend among the juveniles by increasing the proportion of females in the 6-9 week group and slightly decreasing that of males in the 18+ week group. But the picture is essentially unchanged: an excess of males becomes obvious from the 14-17 week group onwards and mortality rates in both sexes are then approximately equal until adulthood is attained. Work on this project is to be continued and should confirm the figures we have, or allow a more accurate approximation to the truth to be made. However, the present findings seem of sufficient importance to justify their publication at this stage so that other workers might be prompted to look for a similar phenomenon elsewhere. Lack (1954) reviews some markedly unequal sex ratios claimed to occur among the young birds of a few species—in particular, some of the *Icteridae* and the sparrow hawk *(Accipiter nisus)*—but he makes the point that equality is usual in young birds as a group. But, as we have just seen and reflection will show, this does not mean that a trend may not be occurring *within* such a group. Nevertheless, because there are relatively few species in which it is possible to age and sex birds from an early stage, such a trend would be hard to detect unless it were uniform throughout, and the sexual differences in mortality of a reasonable magnitude.

ACKNOWLEDGMENT

I should like to thank Dr. R. M. Williams, Applied Mathematics Laboratory, D.S.I.R., for some helpful suggestions about statistical treatment of some of the data in this paper, and Mr. V. C. Barton and Mr. M. M. Small, rangers of the Department of Internal Affairs, for their valuable assistance in carrying out the trapping and banding.

LITERATURE

CAMPBELL, H. & L. LEE. 1956. Notes on the sex ratio of Gambel's and scaled quail in New Mexico. *Jour. Wildl. Mgmt.*, **20**: 93-94.

EMLEN, J., JR. 1940. Sex and age ratios in survival of the California quail. *Jour. Wildl. Mgmt.*, **4**: 92-99.

GENELLY, R. E. 1955. Annual cycle in a population of California quail. *Condor*, **57**: 263-285.

HICKEY, J. J. 1955. Some American population research on gallinaceous birds. *in* Recent studies in avian biology, A. Wolfson, ed. Univ. of Illinois Press, Urbana.

LACK, D. 1954. The natural regulation of animal numbers. Oxford Univ. Press.

LEHMANN, V. W. 1946. Bobwhite quail reproduction in southwestern Texas. *Jour. Wildl. Mgmt.*, **10**: 111-123.

LEOPOLD, A. S. 1945. Sex and age ratios among bobwhite quail in southern Missouri. *Jour. Wildl. Mgmt.*, **9**: 30-34.

LESLIE, P. H., D. CHITTY & H. CHITTY. 1953. The estimation of population parameters from data obtained by means of the capture-recapture method. *Biometrika*, **40**: 137-169.

PETRIDES, G. A. & R. B. NESTLER. 1943. Age determination in juvenal bobwhite quail. *Amer. Midl. Nat.*, **30**: 774-872.

——— 1952. Further notes on age determination in juvenile bobwhite quails. *Jour. Wildl. Mgmt.*, **16**: 109-110.

ROSENE, W., JR. & F. W. FITCH. 1956. A comparative test of the investigator as a variable in aging quail. *Jour. Wildl. Mgmt.*, **20**: 205-206.

STODDARD, H. L. 1931. The bobwhite quail: its habits, preservation and increase. Charles Scribner's Sons, New York.

THOMSON, D. R. & C. KABAT. 1950. The wing molt of the bobwhite. *Wilson Bull.*, **62**: 20-31.

WALLMO, O. C. 1956. Determination of sex and age of scaled quail. *Jour. Wildl. Mgmt.*, **20**: 154-158.

WILLIAMS, G. R. 1952. The California quail in New Zealand. *Jour. Wildl. Mgmt.*, **16**: 460-485.

New Zealand Wildlife Service, P.O. Box 8007, Wellington, C.I., New Zealand.

DISPERSAL FROM A BANDING STATION: STARLINGS AND ROBINS

BY JOHN T. NICHOLS

STARLINGS

Bird-banders realize that a proportion of the birds at their feeding-and-banding station carry their bands, but that the proportion falls off abruptly a short distance away, and not far away a banded bird is rarely seen. I have computed a theoretical ratio between the proportion of banded Starlings where banded, and an estimated 650 yards away, where I take the railroad train from Garden City, Long Island,

to New York. At the railroad, there are almost always Starlings present, which compete with House Sparrows for bits of bread or other food thrown out to the birds. Meanwhile I have made proportional counts by sight of banded and unbanded Starlings from day to day at both places, for a period of four years, February 1953 through January, 1957, to check against the computed ratio.

The same individuals are counted over and over again, so the counts will be higher than the number of Starlings actually counted, but comparable as proportional percentages. It is also probable that a high percentage of the banded ones are homing to my station, while unbanded individuals tend to be there merely by chance, perhaps only once, so that the percentages merely indicate the proportions present at my station, overstating the proportion of banded birds in the whole population which visits the station.

The results should provide more tangible evidence of what we have known in a general way when considering a bird's daily range, home area, and migration.

Within a radius of 650 yards (and more) from my banding station, Starlings are everywhere abundant. They occur concentrated in flocks at one place at one time, at another place at another, but in the long run one may assume that their numbers vary with the area, which varies as the square of the radius. They can go in any direction from my station, and the proportion of my birds at any place should vary inversely as the square of its distance.

The counts at my banding station total 3504, unbanded 2342, banded 1162, 33.2 percent. Those at the railroad total 2309, unbanded 2305, banded 4, 0.174 percent, or between 1 and 2 per thousand. At the close of the first 27 months they totalled 489, unbanded 485, banded 4, 0.840 percent, or over 8 per thousand; but in the last 21 months, though counts were higher, there was not a banded individual.

Assuming that the percentage of my banded birds does not vary greatly for a radius of 45 yards or a little more, as most Starlings come in to my feed from as far as that, or when as near are likely to come to it, the expected percentage of banded at the railroad would be 33.2 divided by 14 squared, or 0.17 percent. I conclude that the chance of an individual being recorded at my station, at a time when it is based 650 yards away, is remote.

In Juncos and White-throated Sparrows, the percentage of banded individuals at my station rises notably through late fall and winter with the number of new ones banded. But there is no definite correlation between rise of percentage and new birds banded in the Starling. I assume that being trapped is more of a repellent to Starlings, but when individuals have acquired the habit of using the station before they were banded, they tend to return to it later. Important factors in a bird's homing are probably mental qualities it shares with man, namely habit formation, the pleasure of recognition and the kind of possession which recognition implies.

The Starling is a bird with a wide daily range. It is probable that banded individuals which come to my station know an appreciable surrounding "home area" intimately, and home to the station visually, as a

man might, and likely that such of them as are permanent or summer residents nest not far away in this home area. The borders of what I call their home area may not be well defined, and are probably considerably more rather than less than the distance to the railroad, but when they range a score of miles or more outside these borders (something not unlikely for a Starling to do, even in the course of its day), I question if they have much knowledge of the intervening territory, beyond distances and directions, and the ability to come home across it. It is not unreasonable to suppose that there are other feeding stations in their home area which my banded Starlings use (and home to), but they probably do not move from mine to another sufficiently as a unit to make an appreciable percentage of Starlings there.

The percentage of banded Starlings at my station varies greatly from one month to the next, in any year, showing some correlation with season, though the same months show wide differences in different years. The actual counts, though somewhat fortuitous, when added together for the four years in the following table are more revealing than the percentages alone.

	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Total	335	506	495	309	149	49	70	175	252	572	404	188
Unbanded	237	360	284	148	76	37	45	122	201	437	273	122
Banded	98	146	211	161	73	12	25	53	51	135	131	66
Percent Banded	29	29	43	52	49	24½	36	30	20	23½	32	35

ROBINS

Data to hand on Robins may make clearer my present hypothesis of a bird's home area, and more restricted and temporary home station, with which view I have correlated the above Starling data.

The spring of 1956 was cold and backward. Snow lay on the ground, at least in patches, until the latter part of April. I trapped only two Robins that spring, a male on March 25, which I banded, and a female on April 8, which was a return from April 30, 1955. But several frequented my feeding and trapping station by a small spruce tree in front of the house, where there was some bare ground, for twelve days or so in April. From proportional counts made, there were more banded (68½ per cent) than unbanded (31½ percent) individuals present. From slight plumage differences, there were at least two each of banded males and females involved, probably more. Then, as the snow melted and their feeding ground elswhere opened up, after April 19, Robins ceased abruptly coming to my station. Only occasionally, one drifted through the yard, so far as I could see an unbanded individual.

An interesting point is, that while frequenting it, individuals that did so, particularly the banded ones, took a proprietary, "territorial" interest in the station, often driving away other Robins that came along. I have no doubt they were in their general home (nesting) area, presumably in the territorial phase of their annual cycle, but judge their ultimate home stations (nesting "territories") were well outside my yard.

The American Museum of Natural History, Central Park West at 79th St., New York 24, N. Y.

THE NIGHT DRIVING OF COOTS FOR BANDING ON THE WINTERING GROUND IN LOUISIANA

BY LESLIE L. GLASGOW

During the past few years there has been an increasing interest in the American coot *(Fulica americana)* as a game bird while at the same time there has apparently been a decrease in the number of birds wintering in the Mississippi Valley. Because of the decline of this species and its importance as a game bird, it seems advisable to report the successful capture of coots by driving them at night on City Park Lake, Baton Rouge, Louisiana, during the winter of 1951-52.

LOCATION AND DESCRIPTION OF CITY PARK LAKE

City Park Lake is located within the city limits of Baton Rouge near the Louisiana State University Campus. This lake, which contains approximately 49 acres, was flanked on two sides by residential areas, on one end by a golf course and park and on the other end by University Lake.

Only a small part of the lake was over six feet deep. The perimeter of the lake was bordered with a band of Alligator weed (*Alternanthera philoxeroides)* and water primrose *(Jussiaea diffusa);* sheltered bays contained floats of water hyacinth *(Eichhornia crassipes)* and duckweeds *(Lemna minor* and *Spirodela polyrhiza)* while shallow water areas were covered by extensive beds of coontail *(Ceratophyllum demersum)* and southern naiad *(Najas guadalupensis)*. The submerged plants were covered with a dense growth of algae. Fifteen cypress trees *(Taxodium distichum)* were scattered about the lake.

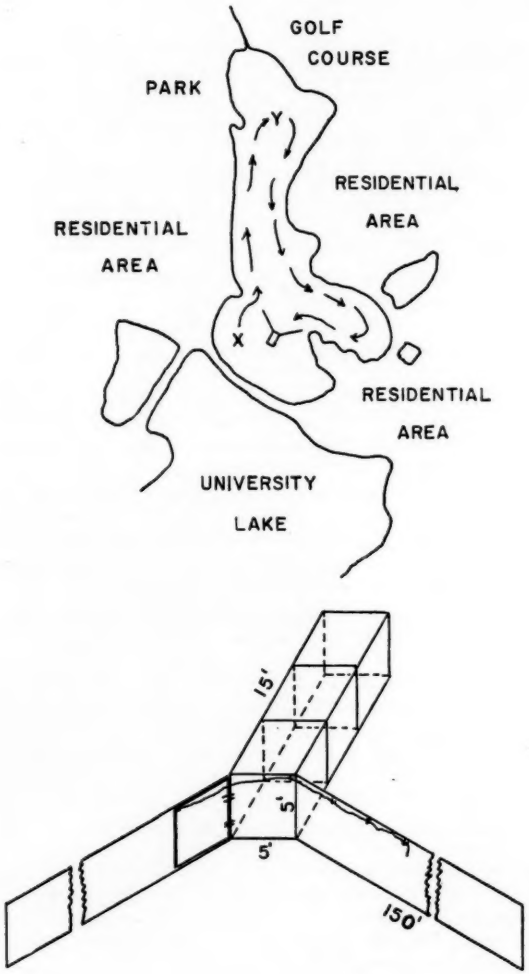
The shallow muddy bottom and the submerged vegetation provided a growth media for myriads of Amnicola, Planorbis, Lymnaea, Physa and Vivipari mollusks.

The following water birds were present on the lake about a week before the drive: 600 coots, 125 ringnecked ducks *(Aythya collaris)*, 70 lesser scaup *(Aythya affinis)*, one juvenile blue goose *(Chen caerulescens)* and 35 pied-billed grebes *(Podilymbus podiceps)* and a few other water birds.

MATERIALS, CONSTRUCTION AND PERSONNEL

Materials required for the drive were (1) three rolls of five foot poultry netting with a one inch mesh, (2) 20 pine slats 1″ x 2″ x 5′4″, (3) 28-10 foot bamboo stakes, (4) 16-2½″ x ¼″ bolts, (5) one 100 x 6 foot fish seine, (6) six boats, (7) 100 feet of small rope, (8) 10 burlap bags and (9) six night-hunter's head lights.

Four pine slats were nailed at regular intervals to each of four 15 foot sections of wire. These sections were bolted together to form a rectangular box with the slats on the outside. The corners of the wire were then lashed together. The wings were extended in a "V" fashion from the trap to form 150 foot leads which funneled the coots into the trap.



DETAILS OF TRAP CONSTRUCTION

FIGURE 1

About 12 Game Management Students and five visitors assisted with the drive.

DRIVE PROCEDURE

The trap was placed in the lake during the day on bamboo supports as shown in Figure 1. Lead stakes were driven during the day but the lead wires were not erected until about one-half hour before the drive. Since the water at the trap site was about five feet deep, a 100 x 6 foot fish seine was extended from the bottom of the lake to the lower edge of the wire in front of the trap to prevent coots from escaping by diving.

The coots normally rafted up at night at location "X" shown in Figure 1. They were driven from this position to location "Y" while the lead wires were being placed on the stakes. Following erection of the wings, the coots were driven on the route indicated by the arrows in Figure 1.

RESULTS AND DISCUSSION

The moon was down, a slight south wind was blowing and the temperature was mild at the time of the drive. The coots were easy to drive and were kept under observation by occasional checking with the head lamps. As they approached the trap, they became excited; some flew over the lead nets and many stampeded between the boats; however, 89 coots, 2 pied-bellied grebes and one blue goose entered the trap. The birds were removed, placed in the burlap bags and taken to the shore for banding.

A second attempt to drive the coots was made the following night when an equal number of coots were on the lake. Evidently they remembered their previous experience for most of them flew over the trap or stampeded between the boats with only 12 birds entering the trap.

RECOMMENDATIONS

The following suggestions, some of which were recommended by Cowan and Hatter in 1952 for the driving of diving ducks, are given for future coot drives: (1) avoid driving coots in vegetation-choked water, (2) place trap in area where coots normally wish to stay, (3) drive down wind during dark of moon, (4) place trap so that coots cannot see it until quite close and (5) keep drivers quiet. It is probable that it would be easier to drive coots during a rain.

Since thousands of coots winter in the Southeastern Coastal States, it is believed that many could be banded by adoption and modification of the night-drive method.

REFERENCES

COWAN, I., AND J. HATTER. 1952. A trap and technique for the capture of diving waterfowl. *Jr. Wildl. Mgt.*, **16**(4): 438-441.

Louisiana State University, School of Forestry, Baton Rouge 3, La.

AN IMPROVED DRYING FORM FOR BIRD STUDY SKINS

By Merrill Wood

While perfect study skins can be produced by careful wrapping with cotton or cheesecloth, or by the use of a cardboard drying form (Anderson, 1932), experiments were carried out to find an easily made form which might be better for student use in that it could be mastered quicker. The aluminum forms of Dr. John B. Hurley, Yakima, Washington, are excellent, except that tails cannot be pinned and occasionally when used by the inexperienced they roll and dump the specimen.

An improved device is found in a metal half-cylinder attached to a wooden base. The aluminum or stainless steel part was made by bending a 26-gauge metal sheet over a pipe of suitable diameter, then the edges were trimmed for better shape and smoothed for safety. This form was then nailed to a wooden base which provides a sturdy non-tipping holder that allows the tail to extend over the wooden base where it may be slightly spread and held with pins. The stuffed bird is placed on its back in the metal part which produces a well-rounded back to the specimen. The open top and ends of this metal part allow quick and easy adjustment of the wings and feathers of the underparts of the bird. The speed of drying in the metal form has been satisfactory.

SIZES FOR DRYING FORMS (MEASUREMENTS IN INCHES)

Form size	Wood base size	Sheet metal size before rolled	Metal form size after rolled	Outside diameter of pipe rolled over
1	4.0 x 1.0	2.0 x 1.5	2.0 x 0.5	0.5
2	4.5 x 1.5	3.0 x 1.75	3.0 x 1.0	0.9
3	5.5 x 1.75	3.5 x 2.5	3.5 x 1.25	1.1
4	6.5 x 2.0	4.0 x 3.0	4.0 x 1.5	1.3
5	8.0 x 2.25	5.0 x 3.75	5.0 x 2.0	1.6
6	10.0 x 3.25	6.0 x 4.5	6.0 x 2.25	1.9
7	12.0 x 4.0	8.0 x 8.0	8.0 x 3.5	2.4
8	14.0 x 4.75	8.5 x 8.5	8.5 x 4.5	4.25

The sizes of forms are used for birds like the following: 1 Ruby-throated Hummingbird, 2 House Wren, 3 Yellow Warbler, 4 House Sparrow, 5 Common Starling, 6 Common Grackle, 7 Rock Dove, and 8 Ruffed Grouse.

LITERATURE CITED

ANDERSON, R. M. 1932. Methods of Collecting and Preserving Vertebrate Animals. Bulletin 69. National Museum of Canada.

Department of Zoology and Entomology, The Pennsylvania State University, University Park, Pennsylvania.

DISEASES AND INJURIES OF JAMAICAN BIRDS

BY CHARLES H. BLAKE

From August 1955 to May 1956 as holder of a Fulbright fellowship in Jamaica I was able to handle about 860 birds of forty-odd species at various places on the island. It is not surprising that some evidences of disease, deformity or injury were found. Unfortunately it was not feasible to make a special investigation of the pathology of these examples.

Streamer-tail *(Trochilus p. polytmus)*. An immature male had the mandible blunt and deflected at the tip. More than 70 examples of this species were handled.

Loggerhead flycatcher *(Tyrannus caudifasciatus jamaicensis)*. Two out of three handled at Woodstock (Westmoreland)[1] showed more or less swelling of the bases of the toes. Six others banded elsewhere were normal.

Northern mockingbird *(Mimus polyglottos orpheus)*. One of two banded at Woodstock had the bases of the left toes swollen. Eight banded elsewhere were normal. This swelling of the toes was only seen at Woodstock, unless the male redstart noted later at Hermitage Dam showed the same affection. I rather doubt that this swelling is an earlier stage of what is described below as "scaly leg." No examples of the latter were seen at Woodstock.

White-chinned thrush *(Turdus aurantius)*. Four of the seven banded at St. Michael's Seminary, Manning's Hill (St. Andrew), showed swelling of the toes or tarsi with strong distortion of the scales. No indication of exudation was noted. In appearance the condition resembles "scaly leg" (cnemidocoptiasis) in the red-winged blackbird. I am adopting the term for the condition seen in the West Indies without proof of identity. It was not found on 10 white-chinned thrushes banded elsewhere but did occur on two birds of other species banded at the Seminary.

Bananaquit *(Coereba f. flaveola)*. One out of four banded in Prof. Parry's garden, Mona (St. Andrew), had a swelling at the chin about

[1]Parish names in parentheses.

five mm. long and about three mm. in diameter. The left side of the maxilla was distorted. Compare the black-faced grassquit described beyond.

"Scaly leg" was noted for one of five bananaquits banded at Liguanea (St. Andrew) and one of 34 banded at St. Michael's Seminary. The only bananaquit *(C. f. portoricensis)* banded at Ponce, P. R., showed very severe "scaly leg." At other localities in Jamaica 63 bananaquits were handled without finding the condition.

Orangequit *(Euneornis campestris)*. Of 10 banded at Hermitage Dam (St. Andrew) one had the right middle toe missing beyond the second phalanx and also a healed break of the upper right tarsus. One out of 29 banded at St. Michael's Seminary showed an abbreviated right hind claw. Seventy-four of this species handled at other places had no apparent injury or disease.

Black and white warbler *(Mniotilta varia)*. Twenty-two were handled, of which one had the tip of the maxilla missing.

Parula warbler *(Parula americana)*. One had the left leg missing beyond the middle of the tarsus. In all, eight were handled. An incident recounted to me some months ago suggests that amputations of this sort may be the result of strangulation of the leg by nesting material while the victim is a fledgling.

Ovenbird *(Seiurus aurocapillus)*. Out of 49 banded one had a healed break of the left tarsus.

Redstart *(Setophaga ruticilla)*. One out of two banded at Hermitage Dam showed a swollen basal phalanx of the right hind toe. I do not know whether this swelling was of the same origin as those noted above. Eighteen redstarts banded elsewhere were normal.

Jamaican oriole *(Icterus l. leucopteryx)*. One of the two orioles banded at St. Michael's Seminary had "scaly leg" of the left toes. Five others banded elsewhere were free of disease.

Black-faced grassquit *(Tiaris bicolor marchi)*. One of 10 banded at Liguanea had a swelling about 10 by 4 by 4 mm. on the underside of the left carpal joint. Flight seemed to be unimpaired. Of seven handled at Hope Gardens (St. Andrew), one had a healed fracture of the right tarsus.

Thirty of this species were banded at St. Michael's Seminary. Three of these had injuries to the feet: end of right rear toe recurved and claw short, straight, and blunt; both outer toes missing beyond the first phalanx; right outer toe missing beyond the second phalanx.

Only one of 44 banded at Content Gap (St. Andrew) showed injury. This one had a fully healed scar on the left side of the head running from above the eye through the nostril and two-thirds the length of the beak.

The 28 birds banded elsewhere showed no injury or disease.

Yellow-backed finch *(Loxipasser anoxanthus)*. One of two banded at Hope Gardens had "scaly leg" of both feet. Forty-three banded elsewhere were normal.

Greater Antillean bullfinch *(Loxigilla violacea ruficollis)*. One of three banded at Hermitage Dam had a healed transverse injury near the middle of the mandible. The theca was grooved and somewhat displaced downward. Thirteen banded elsewhere were normal.

DISCUSSION

Some points stand out clearly from the cases described above. The over-all rate is 3.3 per cent. In itself this figure does not mean much except as a general guide. Visible injury or disease is present on a small minority of birds handled. If we consider the three species which were banded in greatest number, we find a rate of 1.8 per cent for the orangequit, 2.9 per cent for the bananaquit, and 5 per cent for the black-faced grassquit. Even in these species one case more or less would change the figures given by nearly 1 per cent.

Our guide serves to show that the lack of any record for the yellow-faced grassquit *(Tiaris o. olivacea)* is not strange since the expectation is only one case. Similarly, if we apply the over-all rate to the 65 birds banded on Grand Cayman in October, 1956, when no instances of disease or injury were observed, we would only have expected two cases.

In the native birds 59 percent of the total cases may be regarded as disease but only 25 percent of the four cases among the migrants handled. This difference in incidence may be real.

The situation in regard to what I have called "scaly leg" is interesting. It is responsible for at least 61 percent of the observed cases of disease among the local birds. Its incidence in these resident birds is 1.2 percent. At this rate one could only expect about two cases in the 196 migrants from North America handled. It is more informative to consider all the individuals I have handled of the species represented in the Jamaican bandings. This total is 807 and at the rate of incidence for Jamaican breeding birds, one would expect nine or 10 cases instead of none. The available evidence leads to the conclusion that the particular form of "scaly leg" here recorded is confined to arboreal or semi-arboreal West Indian birds and may not be identical with that affecting the red-winged blackbirds in North America.

No injuries of the feet clearly assignable to foot-pox were observed.

The observation of injuries of the right leg more frequently than of the left leg may be a systematic error arising from routine banding on the former leg. Even the attempt made to examine also the left leg might still result in a more cursory view of it.

The location of observed injuries or evidence of disease is reasonably logical. The actual surface of the bird is most readily observed on the lower legs, the front of the head, and the under side of the wings. Elsewhere the feathers obscure all but injuries extensive enough to disturb their orderly arrangement, unless injury or disease results in considerable loss of feathers.

Detectable fracture of a wing bone would almost certainly be too disabling to permit long survival in the wild. I know of two cases in the literature. On the other hand, fracture or amputation of one leg or partial loss of toes of both feet appears to have a rather small effect on survival. Enough injuries or malformations of the beak are observed to suggest that, if healing occurs at all, the ultimate effect is slight.

No instances of loss of flight caused by wing strain during handling, nor of sudden death, were observed.

Museum of Comparative Zoology, Cambridge, Mass.

GENERAL NOTES

A medium-dull White-throated Sparrow in its seventh winter. On March 7, 1957, I trapped a White-throated Sparrow *(Zonotrichia albicollis)* return, No. 138-102953, at my Garden City, N. Y. station. It had been banded on December 3, 1950, had also returned on December 11, 1953, and was now a minimum of 6½ years old, presumably in its seventh winter. But it was still in medium-dull plumage, almost or quite identical with that in 1953 (see Nichols, 1954, *Bird-Banding*, **25**(2) : 60), not having acquired the brightness which I have earlier supposed to be adult winter plumage for both sexes. It was probably the sluggish banded individual seen sitting motionless beside the trap shortly before it was caught; and it bit and squeaked when handled, its behavior contrasting with that of a somewhat brighter bird trapped March 9, which was lively and difficult to hold.

There is considerable variation in the plumage of White-throated Sparrows in fall and winter. They can be roughly classified as dull, medium-dull, medium, medium-bright and bright. What I call high plumage with a great amount of clear white about the head, I have seen only in spring, and assume it is lost before the following winter.

There may or may not be seasonal regression beyond this, or individual White-throated Sparrows that never attain "high plumage." The 1957 return of 138-102953 is worth placing on record, as it may prove helpful in eventually arriving at a more detailed picture of the apparently complicated plumage changes in this species. For further data on the subject see Nichols and Boggs, 1929, *Bull. Northeastern Bird-Banding Assn.*, **5**(3) : 94-97; and Brackbill, 1954, *Bird-Banding*, **25**(4) : 148-149.—J. T. Nichols, The American Museum of Natural History, Central Park West at 79th St., New York 24, N. Y.

Winter Territorialism of Gray Shrikes *(Lanius excubitor)*. The repeated homing of an adult female of the European race (see review no. 19 in this issue) led me to examine my records of these shrikes banded at our station in West Hartford, Connecticut. An immature banded on December 5, 1953, and released some five miles to the westward, returned on January 30, 1954, but did not return again after being transported some eight miles airline in the same direction. In the two following winters, five more (including one adult) were released at distance of seven or eight miles, mostly in the same westerly direction, and none returned. No major geographic barriers intervene, though a low range of hills may have some effect. As no shrikes were seen around our station other than those captured, it is very doubtful that any of these shrikes returned without being recaptured. My impression, from this limited evidence, would be that homing ability on winter territory may vary with the individual, and is less strong in immature shrikes.—E. Alexander Bergstrom, 37 Old Brook Road, West Hartford 7, Conn.

RECENT LITERATURE

BANDING

(See also numbers 14, 103)

1. The Ring. A quarterly "ornithological bulletin" edited and published by Dr. W. Rydzewski, 1 Altyre Road, Croydon, Surrey, England. Photo-offset. $2.50 per year. Every bander will want this useful and informative little periodical. It fills a unique and long-empty niche in banding literature, that of sort of an international "trade journal." Its first number, published in October 1954, is devoted largely to a proposed standardization of methods of publishing recovery reports. Discussion in subsequent issues revised, clarified, augmented, and simplified the proposals into the standard format now being adhered to by most of the European banding groups.

Other issues contain: Short histories of banding programs and prominent banding stations throughout the world; details of punch-card systems for recording data, including several British, an Australian, a French, and a German system as well as the familiar American IBM card; notes on trapping and netting techniques; problems of manufacturing; recommendations for styles of numbers, letters, and address legends on bands.

Each number lists the contents of current issues of all other banding periodicals, including *Bird-Banding*, and notices all published reports of bandings, recoveries, and studies based on banding. A "Notes and News" section describes banding activities in progress here, there, and everywhere. Each issue reports a few outstanding recoveries of particular interest or significance. A useful section lists "mystery bands" of unknown origin and attempts to track them down, successfully in a gratifying number of cases. Of special interest is its listing of maximum longevities reported to date, kept current in each issue.

Dr. Rydzewski is to be congratulated and thanked for the service he is rendering to bird banding the world around. I strongly urge all banders to subscribe to *The Ring*, and to get the back numbers while they are still in print. The most recent issue, No. 10, February 1957, states that Numbers 1 through 9 are still available: No. 1, October 1954 through No. 5, November 1955, $3.00; Numbers 6 through 9, 1956, $2.50.—O. L. Austin, Jr.

2. A Banding Technique for Burrowing Petrels. D. L. Serventy. 1956. *Emu*, **56**(3): 215-218. Describes the monel metal bands used for shearwater researches on islands in Bass Strait which "have given complete satisfaction, and have now been under test for six breeding seasons." These bands are evidently quite malleable, for they can be partly bent and shaped by finger pressure, and wound on the leg, scroll fashion, and closed quite easily with a pair of long-nosed pliers.

The monel bands tried out by the Fish & Wildlife Service some time ago were rejected partly because of their costliness, but primarily because the alloy then used was much too hard and springy to be closed securely, even with pliers. The Australian alloy seems to have overcome this fault, and the cost of the strip bands is not excessive, "about 2d. dearer than the current price of an equivalent-sized American band."

We have lost and are still losing a great deal of priceless data through the impermanence on marine birds of our aluminum bands, even when treated by annealing or electrolytic coating. So much is being spent by the government as well as by private cooperators on banding marine birds that a more permanent band would soon repay the increased cost. Now that suitable alloys apparently are available, the Fish and Wildlife Service should have little trouble justifying the increased cost of better bands for use on sea birds.—O. L. Austin, Jr.

3. The 1955 activities of Ottenby Bird Station. (Verksamheten vid Ottenby fågelstation 1955. Meddelande nr 21.) Wolf Jennings. 1956. *Vår Fågelvärld*, **15**(3): 151-176. (English summary.) During the cold spring of 1955 the migration started unusually late. The delays in the main migration of certain species were notable, for instance, those of some thrushes were retarded into May and of warblers into June. Reversed movements before outbreaks of cold air from the north occurred on several occasions. A scarcity of *Calidris* species marked the fall migration, while a remarkable flight of Sparrow Hawks *(Accipiter nisus)* took place in September, and the increase of Jays *(Garrulus glandarius)* observed in many parts of Sweden was reflected in the Ottenby records during October. A total of 9,522 birds were banded, not quite sufficient to reach the 100,000 mark in the 9 years the station has been in existence. The Robin *(Erithacus rubecula)* headed the list with 1,641 captured, followed by the Starling with 967. Up to 31 Jan. 1956, 155 recoveries were reported of exceptionally many species. Among these the Greenfinch *(Chloris chloris)*, Ortolan Bunting *(Emberiza hortulana)*, Wryneck *(Jynx torquilla)*, Spotted Redshank *(Tringa erythropus)*, and Great Black-backed Gull *(Larus marinus)*, were reported for the first time. The recoveries reveal that Camargue in the Rhône delta is an important stopover locality for shorebirds on migration between Africa and Ottenby.—Louise de K. Lawrence.

4. British Recoveries of Birds Ringed Abroad. E. P. Leach. 1956. *British Birds,* **49**(11): 438-452. "This list continues from that published in 1952 *(antea,* vol. xiv, pp. 458-465), but is in the revised form now internationally adopted." These symbols and terms were adopted at the XIth International Ornithological Congress and give a maximum of information in a minimum of space. One excellent feature is the statement of the latitude and longitude of the place of ringing and of recovery.

A Grey Heron *(Ardea cinerea)* banded in the nest in Sweden was found dead in England 15½ years later. The first foreign-marked examples of four species are recorded as follows: Hobby *(Falco subbuteo)* ringed in the nest in Sweden 20-7-53, shot 23-9-53 in Norfolk; Swift *(Apus apus)* ringed in the nest in Norway 25-7-54, found dead in Yorkshire 25-8-54; Spotted Flycatcher *(Muscicapa striata)* ringed as adult 24-9-50 in France, found dead 14-6-53 in Wales; Grey Wagtail *(Motacilla cinerea)* ringed 6-5-52 in the nest in Belgium, found dead 13-3-53 in Norfolk. Wintering Black-headed Gulls *(Larus ridibundus)* come from northern Europe, Czechoslovakia, Saxony and Bavaria. Two Starlings *(Sturnus vulgaris)* ringed in Holland in October and transported to Switzerland, were found in England in December of the same year, while a third was found there 2 winters later.—M. M. Nice.

5. Report on Bird-Ringing for 1955. Robert Spencer. 1957. *British Birds,* **50**(2): 37-72. The 19th report of the Bird-Ringing Committee of the British Trust for Ornithology is a model of clarity and succinctness. A total of 126,303 birds were ringed, 35,718 being nestlings or chicks. "4,063 recoveries were handled in 1955 compared with 3,043 in 1954." Table II gives ringing and recovery totals for 1955 as well as grand totals. Most of the report is concerned with a selected list of recoveries. Eight Manx Shearwaters *(Procellaria puffinus)* ringed at Skokholm, Wales, were recovered in Brazil. Six tables give the countries and months of recovery of Mallard *(Anas platyrhynchos)*, Teal *(A. crecca)*, and Wigeon *(A. penelope)*. A Lapwing *(Vanellus vanellus)* ringed as a chick June 1947 on Holy Island was recovered 28 April 1952 in the U.S.S.R. An adult Turnstone *(Arenaria interpres)* ringed in Northumberland 30 August 1955 was shot in Gabon 27 October. Another adult ringed in Devonshire 13 January 1951 was killed 14 June 1955 on Ellesmere Island. A Woodpigeon *(Columba palumbus)*, banded as a chick, was killed 9½ years later 2 miles northeast of its birthplace. Two Skylarks *(Alauda arvensis)* ringed in winter were taken in summer in Norway and Finland. Three tables are devoted to the countries and months of recoveries of Starlings *(Sturnus vulgaris)* and Blackbirds *(Turdus merula)*; recoveries of four of the latter from southern France and Spain "are unprecedented." —M. M. Nice.

6. The Goteborg Natural History Museum's Banding of Migratory Birds in 1955. (Göteborgs Naturhistoriska Museums Ringmärkningar av Flyttfåglar under 1955.) Viking Fontaine. 1956. *Särtryck ur Göteborgs Musei Årstryck 1956:* 9-31. The Goteborg Museum's cooperators banded 3,980 birds in 1955, bringing the grand totals since 1911 to 248,960 of 229 species, which so far have yielded 7,385 returns, repeats, and recoveries of 152 species. The Goteborg Museum is one of the few in Europe that have refused to adopt the reporting system advocated in *The Ring* (see no. 1, above). Its list of 268 "returns" reported from 54 species in 1955 contains a high percentage of insignificant recoveries and returns of short duration, especially among the passerines, and the report is not nearly as detailed and useful as it could be made.—O. L. Austin, Jr.

7. Bird-Banding in Norway 1955 (Report No. 6). Holger Holgerson. 1956. *Sterna* **2** (pt. 1, no. 26): 1-48. Banders under the Stavanger Museum auspices banded 37,232 birds in 1955, nearly 8,000 more than in 1954. Only 7,500 of these were trapped as adults or juveniles; the majority, almost 30,000, were banded as nestlings or downy young. The report gives the raw data for some 450 recoveries of 53 species, most of them water birds, with pertinent short comments on the more interesting and significant ones. Among these are large numbers of Pink-footed Geese all banded as adults in Spitsbergen in July 1954 and shot on the wintering grounds mainly in Germany, a few in the Netherlands, Belgium, and

northern France. Of the 525 Pink-footed Geese banded in Spitsbergen in 1954, 72 had been reported by the end of 1955, not a single one of them in the British Isles, which is the wintering ground of the Greenland and Iceland Pink-foots.—O. L. Austin, Jr.

8. Hessian Band Returns. (Hessische Ringvogel-Funde.) Werner Sunkel. 1956. *Vogelring*, **25**(2): 39-59. Annotated compilation of returns of birds banded in Hessia during the last two decades. Material on the Hawfinch *(C. coccothraustes)* is particularly extensive.—Frances Hamerstrom.

9. Bird Banding in 1953. (Prstenovanje ptica u 1953. godini.) Renata Kroneisl-Rucner. 1956. *Larus*, **8**(1954): 5-26. In 1953, 107 Yugoslav cooperators banded 7,441 birds of 97 species, most of them small passerines and about 25 percent of them nestlings. The 70 "recoveries" listed as received during the year are mostly returns and repeats in our terminology. Raw data are also given for 46 Yugoslavia recoveries of 24 species banded abroad in 9 other European countries. None of these records by themselves are of outstanding interest or significance.—O. L. Austin, Jr.

10. Marker for Game Birds. T. H. Blank and J. S. Ash. 1956. *Journal of Wildlife Management*, **20**(3): 328-329. A detailed description of a marker used successfully on *Perdix perdix* for field identification. It consists of a numbered or lettered colored plastic tab which lies on the back, and which is held in place by a soft leather harness around the base of each humerus. Birds thus marked have been recognized as individuals from 150 yards. The marker remains useful for periods from 6 to 9 months.—Oliver H. Hewitt.

11. A Colored Neckband for Marking Birds. John J. Craighead and Dwight S. Stockstad. 1956. *Journal of Wildlife Management*, **20**(3): 331-332. A strap of polyvinyl chloride tape, secured around the neck by a falconer's knot, has been very successful for marking Canada Geese.—Oliver H. Hewitt.

12. A Solenoid Mechanism for Springing Bird Traps. Oakleigh Thorne II, 1957. Thorne Ecological Research Station, Boulder, Colorado, Bulletin No. 4, 6pp. Describes a relatively cheap and simple electrical mechanism for springing non-automatic bird traps that the author claims is "considerably more quick and efficient than the conventional pull-string method."—O. L. Austin, Jr.

MIGRATION

(See also numbers 59, 75)

13. Two Physiological Considerations in Bird Migration. W. B. Yapp. 1956. *Wilson Bulletin*, **68**(4): 312-319. This paper consists of two unrelated theoretical discussions, only the second of which has anything to do with physiology. In the first discussion the author theorizes on what a migrating bird out of sight of land may do when it encounters a cross wind. He gets somewhat tangled in navigation terminology obviously unfamiliar to him, but concludes correctly that if the wind is blowing in the right direction a migrant flying a random course will eventually be carried to land at the velocity of the wind.

In the second discussion he probes into the amount of energy birds consume on long flights. He presents several very impressive formulas derived, however, from unverified assumptions, and concludes that a migrant's energy expenditure will be between 0.4 and 1.0 percent of its body weight per hour. He makes no estimate of the amount of time a migrant could thus spend in the air before exhausting its energy reserves.

It is difficult to determine the purpose of this paper. The discussion on orientation is extremely sketchy, and the discussion of energy expenditure, while detailed, is mainly conjecture. Neither discussion considers the migrating bird in its actual environment.—William H. Allen.

14. Ottenby Bird Station. (Ottenby fågelstation.) Gustav Danielsson. 1955. *Sveriges Natur*, **2**: This is a resumé of the origin of the station and some of the important facts that the work there has revealed. The theory that birds follow certain flyways has now been abandoned. Normally the migrations of birds advance on broad fronts. Because certain species prefer flying over land possessing the character of their specific environmental requirements and avoid flying over unsuited areas, leading lines, principally coastlines, often act as "corralling fences" diverting the migrants into "safer" directions. The north-south coastlines of the elongated island of Öland force the fall migrants to foregather in great numbers at its south end where the station was established in 1946 through the efforts of the newly-founded Sweden's Ornithological Federation. The accidental discovery of large concentrations of birds in May 1949 led to the station extending its activities also throughout the spring migration. The so-called "island-effect" known to influence the flight of birds across the sea, especially on foggy and rainy nights, in the absence of leading lines from the south explained the springtime concentrations at Öland's southern tip. One observer and two banders man the station during the season, assisted by volunteers. Warm weather in the south, warm air sectors with low barometric pressure, are favorable for migratory movement at Ottenby; cold fronts reverse migration southwards across the sea again. Based on a decade of accomplished all-day observations and careful recording, statistical analyses of the gathered material can now begin.—Louise de K. Lawrence.

15. The Migration of Birds at Falsterbo 1949-1950. (Fågelsträcket vid Falsterbo 1949-1950. Meddelande från Falsterbo fågelstation 7.) Staffan Ulfstrand. 1956. *Vår Fågelvärd*, **15**(3): 187-199. (English summary.) The author points out that the Station's figures on yearly fluctuations are somewhat inaccurate because of such variable factors as the relative skill of the observers, the flight patterns of the birds, and the light at the time of observation. Nevertheless, analysis of the data allows certain noteworthy deductions, even if they are not new. Species closely related systematically and ecologically tend to fluctuate similarly in numbers. The fluctuations of selected species observed simultaneously at Falsterbo and at Ottenby do not always coincide, indicating geographical changes from year to year in the migration routes. Meteorological conditions influence migration in countless ways and, though the relationship between the weather and bird movements is extremely complicated, this factor is most important to keep in mind when analyzing the yearly fluctuations at a given locality. Changes in the proportion of migrating individuals within a species, probably in combination with their nesting success, apparently play a significant role in the movements of the so-called irruptive species. If these birds are to be differentiated from the true migrants, not the number of birds observed, but the reasons underlying their migration should first be taken into account.—Louis de K. Lawrence.

16. Bird Observations at Utsira 1917-1954. (Fågelobservationer på Utsira 1917-1954.) Ragnar Edberg. 1956. *Fauna och Flora*, (1-2): 49-64. The publication of migration results from Utsira (see, in particular, H. T. L. Schanning in the *Stavanger Museum Year Books* for 1935-36 and 1937-38) led the author to investigate all the observations made during 37 years on this small island off the coast of Norway on the 59th parallel. Migratory movements to or from the island have seldom been observed, but its situation far from the mainland, like Heligoland and Fair Isle, makes it an attractive resting place for migrants. Muster had suggested the possibility of Utsira being the bridgehead from which the eastern, especially the Asiatic migrants frequently found on Fair Isle, cross the sea. Edberg considers the available evidence insufficient to prove the contention. He lists a total of 150 species for the island, six of which are represented by two races as verified by specimens. The list adds one new species, the Siberian Tree Pipit *(Anthus hodgsoni inopinatus)*, to the European bird list, 4 species and 3 races to the Scandinavian, and 7 species and 5 races to the Norwegian lists. Fifteen species of sea and shore birds and eight passerines have nested on the island.—Louise de Kiriline Lawrence.

17. Lapwings on the Radar Screen. (Kiebitze auf den Radarschirm.) Harry Hofmann. 1956. *Der Ornithologische Beobachter*, **53**(3): 79-81. This paper reports radar observation of a flock of Lapwings *(Vanellus vanellus)* during a flight of about 80 km. in 1½ hrs. The flight path, which is plotted on a map, was most peculiar. Although the birds were flying above heavy cloud cover at an altitude of 2200 m., they appeared to follow a course from one airway beacon to another, including the one at the airport where the radar observations were made. There is, of course, no evidence that the flock was in fact influenced either by the beacons which they could not see, or by the radar installation. The identity of the birds and the size of the flock (about 120) was verified by observers from a sports plane who were directed to it by radio signals based on radar. They were flying between two cloud layers. This observation was made on 31 January 1956 when a slow-moving cold air mass from the northeast was under-running warm air in the area. Flight velocity of the flock was calculated at 55 km./hr. with wind effects being considered negligible.—R. O. Bender.

18. Migratory Associations of Raptors. (Zuggeselligkeit bei Greifvögeln.) Wolfgang von Westernhagen. 1955. *Die Vogelwarte*, **18**(1): 15-19. Species composition of 110 observations (1949-1954) in Northern Germany and Denmark was as follows: *Buteo* sp., 16,000; *Pernis apivorus*, 7,500; *Pandion haliaetus*, 25; *Accipiter nisus*, 830; *Falco tinnunculus*, 114; *F. peregrinus*, 30; *F. columbarius*, 25; *F. subbuteo*, 24; *Circus cyaneus*, 47; *C. aeruginosus*, 12; *Milvus milvus*, 18; *M. migrans*, 4. Counts of Sparrow Hawks and Kestrels, which are common in Scandinavia, would have been markedly higher if comparable counts of raptors traveling alone over a wide area could have been included. Species which are solitary migrants and are not bound by traditional flyways are: *Pandion haliaetus* and *Falco peregrinus* particularly, and *Falco tinnunculus*, *F. subbuteo*, *Accipiter nisus*, and *Circus cyaneus* predominantly. Species which travel in aggregations are the *Buteos* and *Pernis apivorus;* so do *Milvus* spp., but so few Kites go to Scandinavia that they scarcely alter the picture along this flyway. Soaring raptors most commonly migrated when there were rising currents of air. Migration routes and weather are discussed.—Frances Hamerstrom.

19. Winter Territorialism of a Great Grey Shrike *(Lanius excubitor)*. (Winterreviertreue eines Raubwürgers *(Lanius excubitor)*). Georg A. Radtke. 1956. *Die Vogelwarte*, **18**(3): 157-160. During the winter of 1953-54 an adult female Great Grey Shrike was caught five times. Each time it was released in a different direction from the banding station at distances of 2.5, 6.8, 5.6, 18.2, 15.2 and 37.2 kilometers. It homed successfully on all but the last release.—Frances Hamerstrom.

20. The Genus *Coturnix*—an Invasion Bird Group. (Die Gattung *Coturnix*—eine Invasionsvogel-Gruppe.) Friedrich A. Kipp. 1956. *Die Vogelwarte*, **18**(3): 160-164. The Quails *(Coturnix* spp.) show gypsy types of mass movements, comparable in some respects to Crossbill *(Loxia)* movements. The Quails' pointed wings apparently are an adaptation, not only for migration, but for widespread wandering. The range of this genus is uncommonly large for a gallinaceous bird: Africa, Madagascar, Europe, Asia, and Australia. This paper and that of Meise *(Die Vogelwarte*, **17**(3): 211-215) lead the reviewer to question the wisdom of introducing this genus with its weedy spread potential into the United States.—Frances Hamerstrom.

21. Crane Migration at Müritz. (Kranichzug an der Müritz.) Helmut Richter. 1956. *Die Vogelwelt*, **77**(4): 97-108. At Müritz, Germany, an autumn gathering region for Cranes *(Grus grus)*, their fall migration occurs in two phases: (1) early migrants in small flocks of less than 200 that remain in a specific area for an extended period, and (2) the main migration which passes through rather quickly in large numbers. Daily counts of Cranes showed peaks ranging between 2,000 and 2,500 in 1949 and 1954 respectively and up to 10,000 in 1955. In years of high counts the Cranes staved about half as long as in years of low counts. The age ratio of migrants was 5 adults to 1 young. Flocks arriving early contained fewest young. Family groups stayed together and adults still fed well-grown young as late as October. Fall display is described.—Frances Hamerstrom.

22. Migration at the Smith's Knoll Light-vessel, Autumn 1953. D. B. Peakall. 1956. *British Birds*, **49**(10): 373-388. Observations for 2 months from a lightship 26 miles from the Norfolk coast gave information on "effect of wind direction and force on the direction and flock-size of Starlings," and on the time and direction of peak migration of various other species. The main departure of passerines from the continent occurs at dawn.—M. M. Nice.

23. Autumn Migration on the Kintyre Peninsula. Ivan M. Goodbody. 1956. *British Birds*, **49**(11): 417-431. From observations of diurnal migrations on the western coast of Scotland for three successive autumns the author concludes: "The strength of the wind appears important in determining whether birds leave the coasting movement and depart to sea: Skylarks (strong fliers) are less affected than Meadow Pipits (weak fliers). Wind-direction is considered to be of secondary importance and determines which way the birds travel in order to overcome drift." Two maps and six tables are provided.—M. M. Nice.

24. Movements of House Sparrows. D. Summers-Smith. 1956. *British Birds*, **49**(12): 465-488. (See also No. 28.) A table of 33 recoveries of *Passer domesticus* ringed in western Europe and recovered more than 5 miles away contains only 18 records over 20 miles, the greatest distance being 200 miles. Of 436 recoveries in Great Britain, 91 percent are within 1 mile of the place of ringing, 6 percent within 1 to 5 miles, and 3 percent over 5 miles. Of 228 recoveries in Europe, the corresponding percentages are 89, 6, and 5. There is migration, however, in some portions of the range, particularly in Asia. Color-ringing in England has shown that once a bird has bred it is completely faithful to its nesting area throughout the year, although in fall it may travel a half mile to a grain field. A roost in Egypt was estimated to contain 100,000 birds that assembled from a 4-mile radius.

Despite its largely sedentary nature, it has, through small introductions in many parts of the world "multiplied and spread in a remarkable way, so that it is now present in over half of the inhabited area of the earth." An interesting table compares the rate of spread of this species in Siberia and North and South America; the average rate ranged from 1 to 34 miles per year, with a median of 18 miles (p. 478).

"The clue to the House Sparrow's sedentary behaviour may lie in its adaptation to complete dependence on man." Thus it is able to rely on a constant supply of food. Of the author's ringed adults "more have died (disappeared) in the breeding-season and moult than during the winter-months (60% April-September; 40% October-March).—M. M. Nice.

25. The Chaffinch Migration in North Devon. David Lack. 1957. *British Birds*, **50**(1): 10-19. "In late October, thousands of Chaffinches set off out to sea, chiefly W.N.W., from Bull Point on the 'corner' of North Devon, heading for Ireland." The influence of wind direction is discussed, as well as the origin and destination of these and other migrants watched.—M. M. Nice.

26. On Yearly and Daily Rhythm in Migratory Birds. (Ueber Jahres- und Tagesrhythmus bei Zugvögeln. II. Mitteilung.) Helmuth O. Wagner. 1956. *Zeitschrift für Tierpsychologie*, **13**(1): 82-92. Eleven charts are given showing activity in recording cages of various birds kept under changing rhythms of light and darkness. "It is concluded that migratory activities are dependent on an endogenous rhythm, while the everyday changes of periods of activity and rest are determined by external factors."—M. M. Nice.

27. The Visual Observation of Night Migration. B. G. Tunmore. 1956. *Bird Study*, **3**(4): 237-241. Over a 3-year period, 1953 through 1955, members of the Cambridge Bird Club tried to duplicate in England Lowery's studies of nocturnal migration by observing birds flying across the moon. Their efforts were hampered continually by bad weather—clouds and high winds—and only once, on 14 August 1954, were conditions good enough for satisfactory observations. Most of the birds were traveling roughly SSE, but "a smaller number were apparently flying in random directions. No attempt to estimate the density of the passage was

made, although it must have been considerable. It is believed that most of the birds seen were passerines, although a Swift *(Apus apus)* and some Lapwings *(Vanellus vanellus)* were identified." The author concludes: "The coincidence of a full moon, fine weather and migration are not so common here, but some observers may, perhaps, be able to spend some time on this kind of work and might improve our knowledge of migration on this side of the Atlantic."—O. L. Austin, Jr.

POPULATION DYNAMICS

(See also numbers 24, 64)

28. Mortality of the House Sparrow. D. Summers-Smith. 1956. *Bird Study*, **3**(4): 265-270. (See also no. 24.) Analysis of the B.T.O. banding returns shows the annual mortality in House Sparrows *(Passer domesticus)* to be 70 percent in the first year and to average 42 percent in subsequent years. This is considerably lower than the average annual adult mortality demonstrated for other small passerines. The author thinks this "may be accounted for by the constancy of its food supply and by its sedentary habits, by which it avoids the hazards of migration. In Britain the major predator is the domestic cat (birds of prey being too low in numbers to have a significant effect) and without this and motor traffic, which also takes a considerable toll, an even lower figure might be expected."

A further breakdown of the data shows that 54 percent of the adult deaths occur during the breeding season (April to July), while the remaining 46 percent are divided almost equally between the other two 4-month periods. "The main reason for high mortality during the breeding season is considered to be increased predation and the physical effort of rearing successive broods."

I wish the author had gone one step farther and compared his mortality figures for this highly successful species with its reproductive potential and its apparent nesting success and annual recruitment. Such an analysis could be highly revealing.

Unfortunately we have no comparable data on the House Sparrow in North America. Because they are sedentary and extremely local in their distribution, the Fish and Wildlife Service has always discouraged banding them. Most American banders who are inflicted with them at their trapping stations regard them as plagued nuisances, and many just quietly dispose of all they catch. They eat enormous quantities of bait and tend to drive away the more desirable indigenous species. At the A.O.R.S. we destroy them as fast as they appear to prevent their usurping our nesting boxes and interfering with our Tree Swallow and Bluebird studies. Nevertheless by neglecting to band them we are missing opportunities for useful and significant research. Certainly it would be most worth while, if opportunity presents itself, for some suburban bander or group of banders to concentrate on the species and work out its demography in this country.—O. L. Austin, Jr.

29. Territoriality and Survival in the Plain Titmouse. Keith L. Dixon. 1956. *The Condor*, **58**(3): 169-182. Twenty-two adult and 39 1st-year Plain Titmice, *Parus inornatus*, were color-banded during a study which extended intermittently from 1946 to 1952. All observations were made on a 144-acre wooded area in Strawberry Canyon in the Berkeley Hills of Alameda County, California. Territories tended to remain constant all year, and year after year. Boundaries were maintained following disappearance of adjacent territory holders; no expansion was made into vacated areas. Of particular interest is the high annual survival rate (about 75 percent) which is attributed to the year-round territoriality of the population studied. This implies a life expectancy in territorial adults on the order of 3.5 years. High juvenal mortality is probable during the period of dispersal.—L. Richard Mewaldt.

30. The Breeding of the Dipper in North Westmorland. R. W. Robson. 1956. *Bird Study*, **3**(3): 170-180. The breeding population on the Eden River and its tributaries during 1952-55 was from 3.5 to 4 pairs per 25 square kilometers, and was higher in sandstone than in limestone areas. The author

tabulates data on local movements of banded birds, clutch size, and breeding success. The annual mortality, figured from the observed breeding success in this assumed stable population, is theoretically 64.4 percent.—O. L. Austin, Jr.

31. A 17-year-old Swift. (Ein siebzehnjähriger Mauersegler.) Emil Weitnauer 1956. *Der Ornithologische Beobachter,* **53**(3): 94. A Swift *(Apus apus)* banded on 17 July 1939 in a nest in Oltingen returned to nest in 1942 and each year thereafter until 1951. In 1948 the bird was determined to be a male. He returned again to nest in 1956 at 17 years of age.—R. O. Bender.

NIDIFICATION AND REPRODUCTION

(See also numbers 44, 47, 52, 60, 62, 69, 72, 81, 83, 87, 89)

32. A Sea-Cave Nest of the Black Swift. Ken Legg. 1956. *The Condor,* **58**(3): 183-187. This appears to be the first record of the nest of the Black Swift *(Nephoecetes niger)* in a sea-cave. The cave, which is open to surf at high tide, is located near Santa Cruz in Santa Cruz County, California. The thick-walled, compact nest was composed almost entirely (90%) of live, green seaweed *(Enteromorpha* sp.). Apparently no saliva was used. The one egg present in the nest on 7 July hatched probably on 3 August, suggesting an incubation period of about 27 days. The nestling period of 45 days terminated on 17 September. Although naked on 4 August, the young Swift had a heavy covering of down on 18 August, and had short tail and wing feathers on 25 August, the day it was banded. A fresh pellet apparently regurgitated by the nestling was found on 18 August. Portions of winged ants, a crane fly, a damsel fly, and some beetles and flies were found just outside of the nest.—L. Richard Mewaldt.

33. Age Determination and Dating Nesting Events in the Willow Ptarmigan. Kaj Westerskov. 1956. *Journal of Wildlife Management,* **20**(3): 274-279. Information on this subject from 11 important Norwegian papers (1922-1942) is presented and compared with the few North American data available. A reference chart for back-dating nesting events is based on the ptarmigan's definite wing moult sequence.—Oliver H. Hewitt.

34. The Way of a Dove. V. T. Lowe. 1956. *Emu,* **56**(3): 167-182. An amateurish but significant study of the nesting habits of the Peaceful Doves *(Geopelia placida)* resident on a fruit farm in southeastern Australia, of interest particularly for its evidence of the species' almost continuously successive nestings during the breeding season (September to February). The author was able to follow the activities of one color-banded male through 11 nestings in two breeding seasons with three successive females. This male participated in 7 productive and 1 incomplete nesting in a single breeding season. The paper also contains good notes on predators, courtship, territoriality, voice, and behavior.—O. L. Austin, Jr.

35. Further Data on African Parasitic Cuckoos. Herbert Friedmann. 1956. *Proceedings of the United States National Museum,* **106**(3374): 377-408. Information on 11 species of 4 genera in regard to host species, egg-laying, eviction of eggs and young of hosts, etc. A detailed account is given of eviction activities and of development of a nestling Red-chested Cuckoo, *Cuculus solitarius,* as well as courtship feeding in the Emerald Cuckoo *(Chalcites cupreus),* and Didric *(Chalcites caprius),* although in one case with the latter species it was a well-grown young being fed by an adult male, suggesting "that fledgling feeding may be only courtship feeding with a grown young being mistaken for a hen by the cock bird."—M. M. Nice.

36. Bigamy in Swallow. R. A. Richardson. 1956. *British Birds,* **49**(12): 503. A color-ringed male *Hirundo rustica* nested normally in 1953, 1954, and 1956, but in 1955 he had two mates, one color-ringed, that nested at the same time within 4 yards of each other. He fed only one brood and the other young died

when half-grown. "The successful female disappeared after her brood had fledged, and the male and the 'neglected' mate then co-operated in rearing a second brood."—M. M. Nice.

37. Breeding Biology and Development of Young in the Curlew. (Zur Brutbiologie und Jugendentwicklung des Brachvogel *(Numenius arquata* L.). Otto v. Frisch. 1956. *Zeitschrift für Tierpsychologie,* **13**(1): 50-81. Curlews were studied in a bog area near Munich and some were hand raised. Sexes were distinguishable, for the female had a rounder and clumsier form, while the male was more slender and angular. "Each male defends its territory in two ways, 'passively' through its territory-marking flight and 'actively' in a fighting behaviour which is highly ritualized and rarely leads to actual attack." Eggs were incubated by both parents for 29 days; they usually changed places twice daily. The young were very independent, finding their own food from the first, needing their parents for the first 2 weeks for warmth and after that only for warning from danger and repelling enemies. The chicks crouched spontaneously upon the sight of a large bird in the air or an enemy on the ground; in a few days they associated the parents' warning cry with the danger. They had a very loose bond to one another; at the end of 3 weeks the hand-reared birds began to threaten one another and developed a dominance order. Curlews evidently do not breed until over a year old. A very fine study.—M. M. Nice.

38. Collared Turtle Dove breeding at Varberg. (Turkduvan *(Streptopelia decaocto)* häckfågel i Varberg.) O. F. Reuterwal. 1956. *Vår Fågelvärld,* **15**(4): 262-268. (English summary.) Evidence of breeding by two pairs from April to November 1956 was obtained in southwestern Sweden. During the nest-building the male finds and carries dry twigs to the female, who sits in the crotch of a branch and merely puts them under her. The wind often blew down these nests. Only two broods were raised. The method of nest-building and the predation of Magpies *(Pica pica)* were evidently to blame for the poor nesting success.—Louise de K. Lawrence.

39. Hybridization between Fieldfare and Blackbird. Bastarder mellan björktrast (snöskata) och koltrast (Turdus pilaris L. ♂ X Turdus merula L. ♀). Viking Fontaine. 1955. *Fauna och Flora,* (6): 225: 233. (English summary.) In 1950 a pair of Blackbirds nested as usual in the conservatory of the Botanical Gardens at Gothenburg, Sweden, to which they had access through an open window. Incubation was in progress when a male Fieldfare entered the conservatory and, after fierce battles, finally ousted the male Blackbird. The female accepted courtship-feedings from the male Fieldfare. Her brood of true Blackbirds was duly raised and fledged, whereupon mating occurred between her and the Fieldfare. From this union she laid four eggs and the pair successfully raised the four hybrids. While individually separable, the young birds bore greater resemblance to the Fieldfare in color and markings than to the mother Blackbird. One of them escaped, but the other three were kept until they died and their skins were preserved. A more detailed account of the behavior of the birds during the various stages of this rare liaison would have been of utmost interest. According to the records, the Fieldfare has figured before in extra-specific matings among thrushes, once with another Blackbird and another time with a Redwing *(Turdus musicus).*—Louise de K. Lawrence.

40. At a nest of the Golden Oriole in southern Scania 1955. (Vid ett sydskånskt bo av sommargyllingen *(Oriolus o. oriolus* L.) år 1955.) Walter Hermanson. 1956. *Fauna och Flora,* (1-2): 15-21. This paper is based on 23 hours of observation at a nest built about 90 feet from the ground in a large beech. Incubation was shared by both sexes and the change-overs were signaled by fluting notes. After hatching the parents fed the young at a mean rate of about 12 to 13 times per hour. The female, which accounted for 40 percent of the feedings, foraged farther afield and apparently brought larger meals than the male. The four young left the nest in the course of 2 days after 13 to 14 days of nest life. At this time they could fly only very short distances and the female accounted for most of their feedings. Two days later the family had left the nesting territory.—Louise de K. Lawrence.

41. Two nests of the Grasshopper Warbler in central Sweden. (Två bofynd av gräshoppsångaren *(Locustella naevis)* i södra Dalarna.) Sune Norström. 1956. *Fauna och Flora,* (1-2): 33-37. No nests of this warbler had been found in the province of Dalecarlia until the present discoveries in August 1955. The nests were built on the ground and made of stalks and narrow blades of grass. One contained four young, the fifth lying dead outside, the other had five young and one addled egg. As the observer was about to replace the cover after his inspection of one nest, a parent arrived with food in the bill. Immediately it adopted the sleeping posture, obviously a displacement movement in response to the unexpected situation. When the observer resumed his activity before withdrawing, the bird abruptly attacked his fingers. Similar behavior was observed at both nests on three occasions.—Louise de K. Lawrence.

42. Bank Swallows *(Riparia riparia)* as nesting birds in walls along the Mosel. (Uferschwalben als Brutvögel der Mauern entlang der Mosel.) Bernhard Jakobs. 1956. *Ornithologische Mitteilungen,* **8**(10): 198. The author estimates that, along the Mosel where natural nesting places are scarce, 30-40 percent of the breeding Bank Swallows nest in stone or concrete walls. Drainpipes through these walls, as well as crevices in the stone walls, are used as nesting sites. Rosenberg *(Orn. Mitt.* **8**(6): 109) called attention to this nesting behavior which is also the subject of a short note by Prünte and Mester *(Orn. Mitt.* **8**(10): 197).—R. O. Bender.

43. Swallows nest on the back of a mounted Sparrow Hawk. (Schwalbennest auf dem Rücken eines preparierten Sperbers.) Josef Geibert. 1956. *Ornithologische Mitteilungen,* **8**(12): 236. Recent issues of this magazine have carried short notes on unusual nesting sites used by the Barn Swallow *(Hirundo rustica),* but this one tops them all. A pair of Swallows built a nest on the back of a Sparrow Hawk *(Accipiter nisus*—roughly equivalent to our Sharp-shinned Hawk) mounted with wings spread in the vestibule of a home. Both adults and the young were banded. The following year a pair again occupied this site; the male proving to be one of the brood of the previous year. A fine photograph shows the nest with young.—R. O. Bender.

BEHAVIOR

(See also numbers 34, 35, 36, 37, 41, 90, 92)

44. Studies of the behavior of young Caspian Terns. (Beteendestudier över ungar av skräntärna, *Hydroprogne tschegrava.)* Göran Bergman. 1956. *Vår Fågelvärld,* **15**(4): 223-245. (English summary.) This paper concerns two hand-raised Caspian Terns from the time one was 2 days old and the other was still in the egg 8 hours before hatching. Particularly notable were the abrupt changes that occurred as development progressed in the behavior of the young birds and in the shifts of locality of their territories. Four stages of development were recognized: 1) the nest-stage, 2) the territory stage, 3) the shore territory stage, and 4) the roaming stage.

Reaction to the "fish-call," a combination location and feeding-call given by the parent, was innate, being established before hatching. This call was easily imitated. Even if human speech merely happened to contain several aphonic syllables followed by an accented one, the young birds reacted as to the fish-call by begging notes. During the nest-stage, nothing but the fish-call released the following reaction in the chicks. After this, they followed the parent substitute without the call being given when they were hungry, but ignored him completely when well fed. The importance of the young gaining "acoustic recognition" of the parent is obvious in the crowded conditions of the nesting colony. When the parent lands, bowing and flicking the large red bill from side to side, the signal for the chick to dash to the right bird amid the many and grasp the fish is foolproof. The reaction to the "warning" calls of the adults is also developed before hatching. So long as the old birds kept on giving alarm-calls, the sounding of the fish-call could not elicit any response in the young terns.

During the nest-stage, cold and heat drove the chicks into the nest-scrape when they were outside, where under natural conditions the parent stood ready to hover them. After this time, they found their own favorite spots of cover under rocks and vegetation outside the scrape and thereby gained a recognition of the features of their territory.

The chicks possessed the aggressive movements of the adults from the first days of life. The notes and postures of the begging and aggressive attitudes showed considerable similarity. In the begging posture, however, a round-shaped head was achieved by erecting the black crown and the white feathers at the corners of the mouth while, in the aggressive pose, the head appeared triangular with the feathers of the forehead and along the malar regions depressed. The young terns did not develop the bowing and bill-flicking movements, which are aggression-inhibitive in character, before the age of 3 months.

During the nest-stage, the chicks snapped at any object near them. This was interpreted as a stage of "experimenting" before discrimination was learned. Objects whose color contrasted sharply with the background proved strongly stimulating and the intensive snapping elicited by these objects sometimes acquired the character of continuous play.

No drinking occurred until fledging. Bill-washing after meals developed before flying and food-washing after the birds were fully fledged. The food-washing was released by a weakening of the tendency to feed. It occurred in the adults when the urge to feed the young overpowered their desire to eat the fish themselves and, in the young terns, when their hunger lost part of its edge.

The terns acquired personal recognition of the parent companion. They even knew his boat and sometimes they would come to him despite their strong aversion to flying near forested land.

These are only a few highlights of this notable contribution to comparative ethology. It should gain the attention of all students of bird behavior to learn in particular the painstaking methods and knowledgeable ways in which the author extracted the data and deduced their significance.—Louise de K. Lawrence.

45. Symbiosis between Grey Heron and Fallow Deer. (Symbios mellan häger *(Ardea cinerea)* och dovhjort *(Dama dama)*. Report 1 from Skansen's department of Natural History.) Kai Curry-Lindahl. 1956. *Vår Fågelvärld*, **15**(2): 123-126. (English summary.) Describes how Grey Herons, liberated and breeding near the Skansen Zoological Gardens at Stockholm, feed on insects that collect around the eyes of the deer in the pens, and compares the behavior with that of the Cattle Egret *(Bubulcus ibis)* and Snowy Egret *(Leucophoyx thula)* in relation to ruminants. The remarkable point in this case is that the Grey Heron, in contrast to the usual habits of the egrets, fed on insects captured directly from the body of the animal, and stabbed them so near the deer's eyes with such accuracy as never to cause painful injury. The deer not only submitted to the treatment, but even showed willingness to cooperate. However, the author was not certain whether the observed behavior concerned only one bird and one deer, or the whole colony and herd.—Louise de K. Lawrence.

46. Long-tailed Tits roosting in cavity in the ground. (Stjärtmesar *(Aegithalos caudatus)* övernattande i hålighet i marken.) Knut Borg. 1956. *Vår Fågelvärld*, **15**(2): 130-131. The finding of 10 Long-tailed Tits roosting together in a cavity in a sandbank from December to February during a cold winter is significant in view of observations on American Paridae, which usually assign one roosting bird to a cavity.—Louise de K. Lawrence.

47. Changing of the guard at the nest of a pair of Cranes *(Grus grus)*. (Ett tranpars vaktavlösning.) Sixten Jonsson. 1956. *Sveriges Natur*, Year Book of the Swedish Conservation Society, **46**: 57-58. The male alighted 3 meters from the nest where the female sat incubating, pointed his bill skywards, dropped his wings, ruffed his tail (a sign of great excitement), and trumpeted loudly. The female arose and advanced towards him, posturing in the same way. The birds met, both trumpeting loudly, and passed one another. Trumpeting ceased, the male went to the nest and sank down on the eggs while the female waded up to her belly into the water of the swamp in search of food. Excellent photographs picture the whole sequence of the birds' behavior.—Louise de K. Lawrence.

48. Hoopoe with fledglings on Gotland 1954. (Härfågel *(Upupa e. epops* L.) med ungar på Gotland 1954.) Nils Norén. 1956. *Fauna och Flora,* **(1-2)**: 22-32. Since the middle of the last century the Hoopoe for unknown reasons has decreased until at present it is found breeding only occasionally in southeastern Sweden. An adult was observed feeding five newly fledged young in a pasture on the island of Gotland. The parent probed with its curved bill for food in the ground. The shorter bills of the fledglings distinguished them from the parent. Once when alarmed by a flock of gulls screaming overhead, the Hoopoe stretched itself, raised the crest, and thereupon adopted "cryptic posture"—it crouched flat on the ground, partly extended the black and white checkered wings, and pointed the bill obliquely upwards.—Louise de K. Lawrence.

49. On the question of the Nocturnal Behavior of the Swift. Fifth Report. (Zur Frage des Nächtigens beim Nauersegler V. Beitrag.) Emil Weitnauer. 1956. *Der Ornithologische Beobachter* **53**(3): 74-79. This paper is one of a series which have gradually made it clear that non-breeding Swifts *(Apus apus)*, presumably first and perhaps some second-year individuals, spend entire nights aloft when weather conditions are favorable. In this report the author describes observations made by radar at the Kloten-Zurich airport during four nights in the summer of 1955. Movements of the flocks of Swifts are plotted and their relationship to weather conditions pointed out. The identity of the radar objects as flocks of Swifts was verified on a bright moonlight night from an aircraft directed to the flock by radar. A most interesting study.—R. O. Bender.

50. The Life of the Domestic Hen. (Lebensart des Haushuhns.) Erich Baumer. 1955. *Zeitschrift für Tierphychologie,* **12**(3): 387-401. From boyhood the author has watched with keen interest and sympathy his flock of chickens of very different breeds kept under as natural conditions as possible. He has gained insight into their behavior and capacities that is impossible under the artificial setups favored by most observers of domestic fowl. Play fights within a brood from the age of 3 weeks tend to establish dominance hierarchy, which becomes definitely settled by an outburst of general fighting at about the 7th week. A bond may last between sisters for over a year. Memory for places is strong; a rooster sought out his former sleeping place after an absence of 15 months. Some of the bantams proved particularly ingenious in their methods of retaining dominance over the growing cockerels and pullets of the larger breeds.— M. M. Nice.

51. The Instinctive Behavior Patterns of the Common Gull. (Die angeborenen Verhaltensweisen der Sturmmöwe *(Larus c. canus)*). Kuni v. Pfeffer-Hülsemann. 1955. *Zeitschrift für Tierphychologie,* **12**(3): 434-451. Characteristic postures and calls are described and illustrated and compared with those of the Herring Gull, *L. argentatus.* "Pair formation probably takes place before the arrival on the breeding grounds. The partners know each other personally," particularly by characters of the face. The chick at first does not pick food from the parent's bill as does the young Herring Gull, but the parents put regurgitated material into the chick's open bill. Due to this different method of feeding as well as to the smaller size and weaker voice of the Common Gull chicks, attempts to get Herring Gulls to raise Common Gulls failed.—M. M. Nice.

52. The Biology and Ethology of the Bullfinch. (Zur Biologie und Ethologie des Gimpels *(Pyrrhula pyrrhula* L.)). Jürgen Nicolai. 1956. *Zeitschrift für Tierpsychologie,* **13**(1): 93-132. A 5-year intensive study of wild and captive Bullfinches. The song is weak, given by both sexes, and, in keeping with the non-territoriality of the species, has no significance in repelling males or attracting females in the breeding season, although young males in their first fall and winter sing while "courting" their first and temporary mates. A male or female kept alone sings a good deal and some males show themselves gifted mimics.

In pair formation the "female shows ritualized threatening, the male answers by a display of the belly feathers and lateral bending of the tail." Females that are especially eager for a mate exaggerate the display. "As healthy Bullfinch males are completely inhibited from attacking a female, the male is unable to maintain its display in the face of these actual attacks and flees." Another instinctive movement is the "bill flirt," which evidently originated from courtship

feeding. In engaged and mated pairs the male feeds the female from his crop; this "is derived from the sphere of parental care." "Synchronization of the readiness to mate is largely brought about by the partners showing nesting material to each other." The male chooses the nest site, but the female builds and incubates alone, receiving all her food meantime from her mate. The young are fed by regurgitation on half-ripened seeds. Pairs stay mated for life.

Hand-reared females that were not properly nourished may lay and incubate their eggs, but are apt to kill their young. One of them did feed her young, but failed to brood them after 2 days. A male with similar upbringing killed his newly hatched young. A male 21 days old brooded a nestling 10 days younger and carried away its droppings. "All young males show exclusively female sexual activities until late in winter."

Bullfinches reared in isolation become very attached to their caretakers, but if given mates of their own species during their first winter they make a normal adjustment. But if the bird continues to be kept exclusively with people, it "later accepts one of them as a permanent mate. It is only then that the sexual imprinting to humans has become irreversible. Males reared in isolation behave very tenderly to their human partner, attempt to feed him and are strongly personally attached to him. . . . Females are very aggressive and furiously attack humans." (Quotations from the English summary.) A notable study.—M. M. Nice.

53. Records of the Development of Original and Unusual Feeding Methods by Wild Passerine Birds. W. H. Thorpe. 1956. *British Birds*, **49**(10):389-395. An example of the Blue Tit, *Parus caeruleus*, "learning to wind up a suspended perch on its string and so reach food" is considered as "Trial-and-Error Learning, not Insight." Some passerine birds that do not normally feed in the inverted position have learned to do so to procure bait, particularly in severe weather; it is suggested that this is not true imitation, but that "it may merely be that the attention of the bird is drawn to the food source (local enhancement) and that it then learns the trick in the same way as did the first bird."—M. M. Nice.

54. Notes on Tufted Duck in St. James' Park, London. E. H. Gillham. 1957. *British Birds*, **50**(1): 2-10. From 1953 to 1955 8 to 15 pairs of *Aythya fuligula* have bred in this park in Inner London. During the last 2 years a few nonbreeding adults were present. "One of the surplus males had a fixation for Mallards *(Anus platyrhynchos)* and associated only with courting parties of that species which it accompanied constantly between 27th April and 17th May. This drake Tufted ignored females of his own species and tried only to court Mallard."

As Hochbaum (1944) found with all female diving ducks at Delta, Tufted females deserted their young before they could fly. "In one instance a brood was left when a few days old (these young reared themselves), but most frequently the desertions occurred two-thirds of the way through the fledging period. "The cold and wet summer of 1954 was a disastrous one for breeding Tufted and I saw only two different broods, each of 4 ducklings"; these soon died. Abandoned ducklings showed no tendency to join other broods. Some of the females completed their wing molt in the park, while others went elsewhere. Departure of the young coincided with a passage of migrants.—M. M. Nice.

55. Does Begging by Young Birds Release Sexual Behavior in Adults? (Vermag das Betteln des Jungvogels sexuelles Verhalten beim Altvogel auszulösen?) Hans Rittinghaus. 1956. *Die Vogelwelt*, **77**(4): 116-118. The author describes an adult male Sandwich Tern *(Sterna sandvicensis)* bearing food, displaying to, and mounting a fledged, begging young bird of the same species. He also gives an account of an adult male Skylark *(Alauda arvensis)* descending from a song flight to mount a 14- or 15-day-old juvenile, probably one of his own offspring.—Frances Hamerstrom.

56. Behavior Studies on the Black Woodpecker *(Dryocopus martius)*. A Contribution on the Use of Decoys in the Wild. (Verhaltensstudien an Schwarzspechten *(Dryocopus martius)*. Ein Beitrag zur Methodik des Freiland-Attrapen-Versuches.) Dieter Blume. 1956. *Die Vogelwelt*, **77**(5): 129-151. Stuffed

skins as decoys, papier maché decoys, and calls "Kwih" and "Rürr" were tried on Black Woodpeckers at different times of year, different times of day, and in different parts of territories. Response to calling and to decoys was sometimes "normal," sometimes the reaction was situation-specific, and sometimes substitute behavior (drumming and preening) was elicited. "Kwih" is a relatively undifferentiated call for sex, species, and localization. "Kijak" and "Rürr" calls and associated movements are more specialized and highly differentiated. "Kijak" signifies recognition of species with a warning not to come too close, except in the breeding season when it connotes tolerance, appeasement, and even invitation to the hole toward the female. Males show a multiple behavior pattern toward other males with ceremonious threat, display of hind neck, and "Rürr" calls. Good sketches show behavior patterns.

Substitute behavior (hewing, climbing, knocking, and drumming) decreases at the breeding season. Black Woodpeckers appeared not to become "accustomed" (gewöhnt) to the decoys or to their positions. Blume does not make clear how he determined the absence of learning or conditioning to decoys, nor how he distinguished between substitute behavior and display. A footnote mentions that certain reactions which have been designated as substitute behavior may turn out to be ambivalent movements, redirection activities, and overflow activities or neuroses. A stimulating paper however.—Frances Hamerstrom.

57. Sleeping Habits of Tree Creepers and Other Small Birds on Cold Winter Nights. (Schlafgewohnheiten der Baumläufer *(Certhia brachydactyla, C. familiaris)* und andere Kleinvögel in kalten Winternachten.) Hans Löhrl. 1955. *Die Vogelwarte*, **18**(2): 71-77. Excellent description of communal roosts of up to 20 Tree Creepers, and discussion of the winter sleeping habits of the Goldcrest *(R. regulus)*, Titmice *(Paridae)*, Starling *(Sturnus vulgaris)*, and Wren *(T. troglodytes)*.—Frances Hamerstrom.

58. Winter Fighting in Feeding Flocks of Rooks, Jackdaws and Carrion Crows. J. D. Lockie. 1956. *Bird Study*, **3**(3): 180-190. In a study of feeding flocks of Rooks *(Corvus frugilegus)*, Jackdaws *(C. monedula)*, and Carrion Crows *(C. corone)* for three winters, the author noted aggressive behavior to be connected primarily with mating and food. He describes the threat postures used in various situations. He considers food-fighting and reproductive-fighting functionally different, as the former occurs when food is least available and when sexual behavior is inhibited. He argues that "the social hierarchy is an adaptation to reduce the bodily harm from food-fighting, that the existence of food-fighting implies that the birds which do it are liable to come against the food limit at times, and that when food is short, food-fighting, assisted by the social hierarchy, distributes what food there is unequally, some animals obtaining enough, and others much too little." An interesting analysis of observed behavior, told with a refreshing minimum of the current behaviorist jargon.—O. L. Austin, Jr.

59. The Roosting Times of the Swift. H. F. Church. 1956. *Bird Study*, **3**(3): 217-220. The author timed the roosting of Swifts *(Apus apus)* at a large breeding colony at latitude 55°46'N, and found that the birds came to roost at definite intervals after sunset relatively independently of weather conditions. This interval decreased from 30 minutes at the summer solstice to 15 minutes in mid-August. He attributes this to the birds' reaction to "total light intensity or to that of particular spectral ranges." A possibility he does not mention is that the birds may be reacting to the percentage of polarized light in the skylight when the sun is below the horizon, on which weather conditions have little effect.

Assuming flying time and feeding time to be synonymous, he considers both to be functions of day length rather than of day-to-day weather. He therefore concludes that the additional feeding time of the longer summer days at higher latitudes "is the main reason that the Swift, towards the northerly limit of its breeding range, arrives latest and departs earliest."—William H. Allen.

ECOLOGY

(See also numbers 82, 96)

60. Further results of bird colonization experiments in Beech Woods. (Weitere Ergebnisse über Vogelansiedlungsversuche in Buchenwäldern.) Herbert Bruns. 1956. *Ornithologische Mitteilungen,* **8**(11): 201-206. The possibility of controlling destructive outbreaks of forest insect pests by artificially increasing the bird population is receiving careful study in Europe. Installation of large numbers of nesting boxes has been shown to increase the normal population density in mixed woods several fold, thus demonstrating that nesting site availability rather than food supply has been the limiting factor. (See Bruns 1955, *Orn. Mitt.* **7**(12): 221.)

Since many European forests contain essentially single species of trees and since these uniform forests have been shown to have very low densities of nesting birds (0.1 to at the most 1.0 pair per hectare), it became important to determine whether population increases could also be achieved in these forests by nest-box installation. This paper reports on a study in six test plots in uniform red-beech woods conducted during 1955 and 1956. In order to eliminate local and accidental effects, the six plots were from forests in Northern, Middle, and Southern Germany. Five of the plots were from 4 to 9 hectares in area; the sixth was of only 1 hectare. Nest boxes of several kinds were hung to give densities of 25 and 50 per hectare.

The lowest population determined on a test plot in terms of broods fledged was 2.2 per hectare while the highest (on the one hectare plot) was 19.0. The maximum for a normal sized plot was 13.0 broods, which the author considers a better value. Plots with southwest exposure had higher densities than those facing west or northwest. Densities were higher on the edges of the test plots than in the centers. High densities were principally due to increases in the population of Pied Flycatcher. An excess of nesting boxes is considered desirable in order to provide the birds with a choice of sites and also to provide sleeping quarters for the males.

The effect of increased bird population on outbreaks of forest insect pests remains to be determined but, if the populations can be maintained at these higher levels for a number of years, very interesting information should be obtained.—R. O. Bender.

WILDLIFE MANAGEMENT

(See also numbers 2, 20, 33, 65, 67, 94)

61. Shrub Lespedeza as a Quail Management Plant in Southeastern Virginia. George A. Gehrken. 1956. *Journal of Wildlife Management,* **20**(3): 239-242. A test of the assumption that plantings of *Lespedeza bicolor,* properly made on farms under a good land-use plan, should result in a measurable increase in quail populations. Seventy-nine border plantings, averaging about one acre per farm, were planted on 14 representative farms in 1948. Gehrken censused quail with two dogs on these farms annually through the following 5 years, and annual hunting records from 10 "outstanding" hunters were used. No significant changes were discovered in coveys located per hour, in quail killed per hour, or in juvenile-adult ratios over the 5-year period. No control farms were included in the survey, but figures on coveys flushed per hour and on juvenile-adult ratios conform remarkably with those reported from Missouri. It is concluded that bicolor plantings had no practical benefits in increasing quail populations.—Oliver H. Hewitt.

62. Experiments on Causes of Duck Nest Predation. M. C. Hammond and W. R. Forward. 1956. *Journal of Wildlife Management,* **20**(3): 243-247. Waterfowl nesting studies involving markers, close approach to the nest or disturbance of the incubating female are unreliable sources of information on production. Bias results from nest losses to avian and mammalian predators attracted by the observer's activities. Range cattle often trample nests when they investigate

nest markers. Defecation on the eggs by the disturbed female may increase fox and coyote predation, although an experiment with chicken eggs scented with duck feces failed to prove this point. The authors conclude that "energies devoted to studies aimed at measuring moderate differences in waterfowl nesting success from year to year, between localities, or between habitats would be more wisely diverted to other lines of endeavor if the method of study involves approaching nests and flushing ducks from them."—Oliver H. Hewitt.

63. A Study of Waterfowl Broods in Eastern Montana with Special Reference to Movements and the Relationship of Reservoir Fencing to Production. Paul F. Berg. 1956. *Journal of Wildlife Management*, **20**(3): 253-262. Comparisons of growth of vegetation and duck brood production were made between 12 unfenced ponds and 12 ponds from which grazing livestock had been excluded. Fluctuating water levels prevented evaluation of the benefits of fencing. Forty broods of Mallards, Pintails and Blue-winged Teal were marked with airplane dope. Twelve observations of 9 marked broods indicated movements from 0.38 to 1.02 miles overland. Brood movement was generally from bare ponds to those with emergent vegetation, from small to larger ponds, and from ponds with lowered water levels to those with more stable levels.—Oliver H. Hewitt.

64. Some viewpoints relating to the White-tailed Eagle. (Några synpunkter på havsörnen.) Göran Bergman. 1955. *Sveriges Natur*. (3): 82-87. According to the latest counts, the total adult population in Sweden and Finland of the White-tailed Eagle *(Haliaëtus albicilla)* consists of some 70 pairs. This means that about 100 juveniles are fledged yearly and migrate southwestward to the wintering grounds in southern Scandinavia. Pressure is now being exercised, primarily by hunters of waterfowl, to decimate this stock further. Presenting strong evidence in support of his views, the author points out that any decline in the present population of eagles would spell catastrophe for the species, that other natural controls would replace them, and that the notion of an increase in waterfowl resulting from the disappearance of the eagles is pure "wishful thinking, lacking support entirely in experience."—Louise de K. Lawrence.

PARASITES AND DISEASES

65. Causes of Population Fluctuations in Capercaillie. (Über die Gründe für die Frequenzvariation beim Auerwild.) N. Hoglund and K. Borg. 1955. *Zeitschrift für Jagdwissenschaft*, **1**(2): 59-62. Population decreases of Capercaillie *(Tetrao urogallus)* are primarily the result of poor survival of young of the year. Leucocytozoon was ruled out as a cause. Of some 400 Capercaillie carcasses examined, 30 percent of the deaths were attributed to Toxoplasmosis, which caused 12 percent of Hare *(Lepus* spp.) deaths during the same period (1948-1952). The incubation period of Toxoplasmosis is presumed to be about 2 months. Symptoms of the acute form are ruffled nape and neck feathers and a spiral twisting of the neck, ending in death in 3 or 4 days. The heaviest mortality is in south and central Sweden, in juveniles, and from August through October.

Capercaillie chicks have a poor heat-regulating mechanism. A series of 1129 rectal temperature readings on 30 pen-reared chicks showed the average temperature of newly-hatched, dry chicks to be 37.9°C.; this rises gradually until the 18th day, when the normal adult temperature of 41.6°C. is reached. Chicks chilled quickly even when the air temperature was only slightly below body temperature. Cold and rain produced faster chilling than cold alone. The authors conclude from these data that chick mortality is high in cold, wet weather because the chicks must spend so much time regaining warmth under the hen that even with a good food supply near, they succumb to starvation.—Frances Hamerstrom.

66. Contribution to the study of the ectoparasitic fauna of birds from Croatia. (Prilog poznavanju ektoparasitske faune ptica NR Hrvatske.) M. Zukovic and T. Wikerhauser. 1956. *Larus*, **8**(1954): 102-111. (English summary.) Lists 36 species of biting lice (Mallophaga), 1 fly, and 1 tick collected

from 55 birds of 39 species representing 23 families. Quite a number are apparently new host records.—O. L. Austin, Jr.

67. D.D.T. Poisoning of Birds. Victor A. D. Sales. 1957. *British Birds*, **50**(1): 20-22. Symptoms before death of three birds that had fed in a vegetable garden heavily sprayed with D.D.T.—M. M. Nice.

PHYSIOLOGY AND PSYCHOLOGY
(See also numbers 13, 59)

68. The Body Temperatures of the North Island Kiwis. Donald S. Farner, Norman Chivers, and Thane Riney. 1956. *Emu*, **56**(3): 199-206. The authors obtained a series of body temperature readings at various times of the day and night from captive Kiwis *(Apteryx australis mantelli)* at Hawkes Bay and Aukland, New Zealand. After subjecting these data to exhaustive, complicated (and to me not entirely necessary) statistical analysis they conclude: "Mean nocturnal temperatures for six captive North Island Kiwis were found to range from 38.2°C. to 39.9°C. whereas mean daytime temperatures varied from 36.4°C. to 37.2°C. The weighted mean difference between nocturnal and daytime temperatures, 1.76°C., is statistically highly significant. It appears that the body temperature of this species may be somewhat lower than that of other species of the same order of body size." They have certainly proved, to my satisfaction at least, that the body temperature of the flightless, highly nocturnal Kiwi is, as might be expected, higher at night than in the daytime and somewhat lower on the average than that of flying birds about the same size.—O. L. Austin, Jr.

69. A Method of Sexing Petrels in Field Observations. D. L. Serventy. 1956. *Emu*, **56**(3): 213-214. Sexes of the Short-tailed Shearwater *(Puffinus tenuirostris)* are readily differentiated for some 2 months at the height of their period of sexual activity by the size and shape of the cloaca. The species lays a huge egg, and as the laying period approaches (19 Nov.-3 Dec.) the characteristic differences become pronounced. The female cloaca becomes "transversely distended, with swollen lips," whereas "in male birds, as in non-breeding females, the cloacal opening is small and inconspicuous, with the vent roundish or feebly transverse." After egg-laying the female cloaca gradually relapses to the normal form. It is usually recognizable through December, but "from mid-January onwards, females may barely, if at all, be distinguished from males." Students of species lacking sexual dimorphism have given too little attention to this possible means of differentiating between sexes at nesting time.—O. L. Austin, Jr.

70. Factors Influencing Testis Coloration in Birds. D. L. Serventy and A. J. Marshall. 1956. *Emu*, **56**(3): 219-222. A dissertation on the mechanical and histochemical changes that cause the avian testis to become lighter in color as it increases in size with the onset of sexual activity and darker as it regresses after the breeding season.—O. L. Austin, Jr.

71. The Effect of Diet on Photoperiod-Induced Lipid Deposition in the White-Throated Sparrow. Eugene P. Odum and James C. Major. 1956. *The Condor*, **58**(3): 222-228. Two groups of caged White-throated Sparrows, *Zonotrichia albicollis*, kept indoors at 68° F. were exposed to increased photoperiods beginning November 28. Fifteen minutes of extra light was added daily to the initial 12-hour day until a 16-hour day was reached on December 16. These long days were continued until early February. Group A (10 birds) received a high fat diet while group B (12 birds) was fed a low fat diet. A third group C (5 birds), also kept indoors but on natural photoperiods, was fed a mixed diet. In early February the extractable lipids in the birds of groups A and B greatly exceeded those in group C, and were similar in amount of distribution to normal premigratory birds. The different percentages of fat in the diets of groups A and B had but little effect on the magnitude of the fat deposition. An approximation of food consumption suggests a decided increase in caloric intake at the time of increased fat deposition in both experimental groups. A molt, resembling the prenuptial, and weight increases were induced simultaneously in both of groups A and B about 7 or 8 weeks after light increases were begun and about 5 weeks

after the 16-hour days were reached. A report on the gonadal response (if any) during or at the conclusion of these weight and feather changes would have been interesting.—L. Richard Mewaldt.

72. The Annual Reproductive Cycle of the California Gull. David W. Johnston. 1956. *The Condor*, **58**(2): 134-162 (I. Criteria of Age and the Testis Cycle); **58**(3): 206-221 (II. Histology and Female Reproductive System). This well-presented account of criteria for age determination and of the reproductive biology of the California Gull, *Larus californicus*, is based on 485 specimens collected from 1951 to 1953. Most collections were made on the winter range in the San Francisco Bay region of California and on nesting grounds at Mono Lake, about 175 miles inland. Four age groups (1st-year, 2nd-year, 3rd-year, and adult) are distinguished on the basis of plumage and soft parts; these criteria were confirmed by collecting banded birds of known age. The bursa of Fabricius was present in all subadults, except an occasional 3rd-year bird, whereas out of 122 adult plumaged birds collected, 8 were found to have a bursa.

Although birds leave the coastal areas and move inland in spring, most 1st-year gulls remain away from the nesting grounds. Fewer of each of the successively younger age groups were found at the breeding colonies. Among migrating birds, 1st-year males show very little testicular growth, testes of 2nd-year birds enlarge to about one-fourth adult size, and testes of 3rd-year birds develop to about one-half adult size. No 1st-year or 2nd-year gulls of either sex were found to breed, whereas some 3rd-year females and about one-half of the 3rd-year males were believed to breed. In females, no ovarian follicles enlarged beyond 6 mm. were found except in adults just prior to egg laying.

Attempts to demonstrate ketosteroids in the testes of adults from February to May by the 2 4-dinitrophenylhydrazine reaction and by the hydrazide-tetrazonium reaction were negative. Mouse material, run simultaneously with the gull testes, showed positive tests for the ketosteroid in the interstitial cells. Seasonal variation in size of the ducts of the reproductive system and seasonal or cyclic enrichment of colors of the bill, eye, eyelid, and gape of both sexes are nonetheless attributed to increased androgen production in the spring. The endocrine complex responsible for these cyclic changes is not yet understood.—L. Richard Mewaldt.

PLUMAGES AND MOLTS

73. Pterylography and Molt of the Allen Hummingbird. Elmer C. Aldrich. 1956. *The Condor*, **58**(2): 121-133. This account of pterylography and molt in the Allen Hummingbird, *Selasphorus sasin*, contributes to a relatively neglected area of study. The 10 primaries and 10 rectrices are sexually dimorphic and are specialized in form and structure to serve in production of flight sounds. A frontal apterium in the capital tract appears to be characteristic of the Trochilidae and some other closely related forms. A postjuvenal molt takes place after mid-October. A prenuptial molt observed in 1st-year males is possibly a portion of a protracted postjuvenal molt. Adults apparently undergo one molt only, a complete annual molt between October and February on the wintering grounds.—L. Richard Mewaldt.

ZOOGEOGRAPHY

(See also numbers 15, 16, 20, 48, 59, 101)

74. On the extent of variation of the Camargue Blue-headed Wagtail and the Blue-headed Wagtail immigration into Switzerland. (Über die Variationsbreite der Camargue Schafstelzen *(Motacilla flava)* und die Schafstelzen-Einwanderung in die Schweiz.) Martin Schwarz. 1956. *Der Ornithologische Beobachter*, **53**(3): 61-72. Recently the Blue-headed Wagtail has been found repeatedly nesting in Switzerland. The males of this species have racial plumage differences that make field indentification possible. The racial affinities of the Swiss immigrants were confusing; individuals typical of the Middle European race *M. f. flava* were found as well as some typical of the southern races *cinereocapilla* and *iberiae*. Many others of suspected mixed character have been reported.

In an effort to clarify this situation the author made a careful field study of the racial affinities of the Blue-headed Wagtails of the Camargue in the South of France. Here he found the Spanish race *iberiae* and the Italian race *cinereocapilla* apparently interbreeding; 7 out of 10 males observed were intermediate, 2 were *cinereocapilla*, and only 1 *iberiae*. The author concludes that a substantial part of the Swiss immigration represents birds from southern France. Some of these interbreed with normally migrant *M. f. flava* that remain behind to nest.—R. O. Bender.

75. An over-all picture of the occurrence of the Kittiwake in Switzerland during the winter of 1954/55. (Über das gehäufte Auftreten der Dreizennröwe in der Schweiz im Winter 1954/55.) Ernst Sutter. 1956. *Der Ornithologische Beobachter* **53**(3) : 81-93. During the winter of 1954/55 unusual numbers of Kittiwakes *(Rissa tridactyla)* were observed throughout Central Europe. Peak numbers were observed at the end of December and at the beginning of February. These are shown to be related to severe storms off the coast of France at these times which carried inland over Germany and Switzerland. Comments on behaviour and food are included. This is another of the comprehensive and valuable reports which the European ornithologists prepare on unusual movements of birds.—R. O. Bender.

76. Establishment of Black-headed Gulls *(Larus ridibundus)* in Hamburg City. (Die Besiedlung des Hamburger Stadtgebietes durch Lachmöven *(Larus ridibundus).)* Dierk Franck. 1955. *Die Vogelwelt*, **76**(3): 81-91. A 3-year study shows that Black-headed Gulls wintering in Hamburg reach their population peak in late January. They take up the better habitats in order of their desirability, based on food, visibility, and distance from occupied habitats. Young gulls are forced into the poorer habitats.—Frances Hamerstrom.

77. Two Types of Spread in the Fieldfare *(Turdus pilaris L.).* (Zwei Ausbreitungstypen der Wacholderdrossel *(Turdus pilaris L.).)* J. Peitzmeier. 1955. *Die Vogelwelt*, **76**(3): 91-93. In Lower Saxony and Hesse the Fieldfare shows a spotty, saltatory extension of range. In contrast, this same species has spread in southeast Westphalia in regular progressive increments.—Frances Hamerstrom.

78. Census of Breeding Canada Geese, 1953. N. G. Blurton Jones. *Bird Study*, **3**(3): 153-170. The Canada Goose was first brought to England some 300 years ago. Escapes from parks and aviaries soon established themselves in the wild. This cooperative study of the species' present status shows it to be distributed in isolated, localized sub-populations. "The total population in July, 1953 (adults, non-breeders and goslings), was between 2,200 and 4,000. Non-human predation is small. Man occasionally limits some populations by egg destruction and shooting. Habitat seems not to determine the range of the species. Restricted movements seem to limit the discovery of new waters by geese and to be the cause of the very local distribution."—O. L. Austin, Jr.

79. The Mute Swan Population of the Eastern Borders. H. F. Church. 1956. *Bird Study*, **3**(3): 212-217. "Counts over four years of Mute Swans in the lower Tweed valley and on coastal flats adjoining suggest that there is a regular, seasonal movement between the two habitats, the coast being preferred in the winter. There are, however, discrepancies which may indicate that other haunts are occasionally used. The large summer population which haunts the estuary is composed of non-breeding birds. The percentage of cygnets in wintering flocks is of the order of 10-15 percent. The literature indicates that the Mute Swan has increased during this century in the Tweed area and counts of non-breeding birds along the river indicate a considerable change even in the last ten years."—O. L. Austin, Jr.

80. The Wintering of Blackcaps in the British Isles. J. Stafford. 1956. *Bird Study*, **3**(4): 251-257. The Blackcap *(Sylvia atricapilla)* is a common summer resident in the British Isles. This study of its occurrence in winter is

based on 9 years of B.T.O. records. How many of the wintering individuals manage to survive until spring is debatable, but one case of survival through to spring is described. An interesting and unexplained phenomenon is the apparent tendency of females to be more common in the north and males in the south of the British Isles during winter.—O. L. Austin, Jr.

81. Bird Notes from Spitsbergen, Summer 1955. I. D. Pennie and D. G. Andrew. *Sterna* **2**(pt. 2, no. 27): 49-63. Notes on 29 species observed at this arctic outpost from 26 June to 12 July 1955. Contains some interesting notes on Glaucous Gulls robbing the nests of Pink-footed and Barnacle Geese.—O. L. Austin, Jr.

82. Birdlife in central Jämtland. (Fågellivet i socknarna Rödön, Näskott, och Alsen i mellersta Jämtland.) Nils Nilsson. 1955. *Fauna och Flora*, (4): 145-186. This remarkable continuous record of the avifauna in a particular district of northern Sweden, assembled in the course of 65 years, accents the contribution to ornithology made by the stationary naturalist through meticulous and unintermittent observation and note-taking. The annotated list comprises 151 birds, most of which at one time or another bred in the area. Among the wealth of interesting notes that accompany each species, a few are extracted:

The cyclic fluctuations of the Bullfinch *(Pyrrhula pyrrhula)* were found to be correlated inversely to those of the squirrel, as were those of a few other small birds nesting in conifers. The Skylark *(Alauda arvensis)*, which was common in the beginning of 1900, has now almost disappeared, due mainly to the increased population of roaming domestic cats. On a single occasion in 1931, when the rowan-berries were particularly abundant after the warm summer of 1930, Bohemian Waxwings *(Bombycilla g. garrulus)* nested in the area the following spring and summer. Swifts *(Apus a. apus)* have occupied a nest-box ever since it was affixed close under the roof of the author's house one day in 1903, a period of some 50 years.

The notes furnish repeated evidence of the close relationship that exists between clutch-size and food supply in carnivorous birds. Tengmalm's Owl *(Aegolius funereus)*, for instance, disappears in years when the lemming populations dwindle but returns to the same nesting places when the rodents are again plentiful. It lays 5 to 6 eggs in lean years and 7 to 8 in years of plenty. The Honey Buzzard *(Pernis apivorus)* lays no eggs at all during cold and rainy summers when wasps and bumblebees are scarce, although it remains in the nest locality and may be seen refurbishing the old nest with fresh branches until far into the summer. The Green Sandpiper *(Tringa ochropus)*, which lays its eggs in nests abandoned by other birds, once incubated a clutch laid in a depression on top of a squirrel's nest. Excellent photographs reveal interesting details in the choice of site and nest construction of Crossbills *(Loxia c. curvirostra)*, Siberian Jay *(Perisoreus infaustus)*, Crane *(Grus g. grus)*, and many other species.—Louise de K. Lawrence.

83. Bird observations in Lapland. (Fågelobservationer i Lappland.) C. M. Acland, V. C. Maxse, D. B. Peakall. 1956. *Fauna och Flora*, (4): 162-173. During a 3-week visit at Abisko on the 68th parallel, 81 species were listed. The courtship of 8 pairs of Long-tailed Ducks *(Clangula hyemalis)* observed on the half-frozen lake; the first record for the Torneträsk lake of Black-headed Gulls *(Larus ridibundus)*; a colony of Fieldfares *(Turdus pilaris)* nesting on the shelves of a sheer cliff above the river; the nest of an Arctic Redpoll *(Carduelis hornemanni)* containing 6 eggs; and the nest of a Pine Grosbeak *(Pinicola enucleator)* with 3 young in a juniper, the second nest discovered above the pine tree limit, were the highlights of this ornithological excursion into the land of the midnight sun in the summer of 1955.—Louise de K. Lawrence.

84. Birds of the Gävle Region. (Gävletraktens fåglar.) Gösta Hultberg. 1956. *Vår Fågelvärld*, **15**(2): 81-120. (English summary.) In 1954-55, 14 amateur ornithologists of the Gävle Nature Club undertook a bird count around Gävle in south-central Sweden on the Gulf of Bothnia. Their aim was to inventory the avifauna of this hitherto neglected region for comparison with a count made in 1850. Their carefully worked-out methods are described in detail. The result

was an annotated list of 200 species, of which 135 breed regularly, 4 probably bred, and 61 are transients. The census added 48 species to the 1850 count, but these were reduced to a definite 19 by allowing for the less accurate census methods, fewer observers, and less efficient transportation of a century ago, and other pertinent information.

The most interesting changes include the dispersal northward of the Reed Warbler *(Acrocephalus scirpaceus)*, Marsh Harrier *(Circus aeruginosus)*, and Wood Warbler *(Phylloscopus sibilatrix)*, and the appearance from the east of the Scarlet Grosbeak *(Carpodacus erythrinus)*. On the other hand, such birds as the Roller *(Coracias garrulus)*, Black Stork *(Ciconia nigra)*, and Greylag Goose *(Anser anser)*, which reached their northernmost ranges in the region 100 years ago, have now totally withdrawn. The data show that, in general, bird life has increased in this area during the past century despite the encroachments of civilization upon the natural environs. Some birds have profited by the increased human occupancy, particularly during the cold season. Increased food supplies in the form of garbage and other offal now permit flocks of Laridae and Corvidae to find ample sustenance throughout the winter.—Louise de Kiriline Lawrence.

85. Redwing Breeding at Lake Hornborg, Västergötland. (Rödwingetrasten *(Turdus musicus)* häckande i Hornborgasjön.) Karl Georg Wingstrand. 1956. *Vår Fågelvärld*, **15**(2): 120-123. (English summary). This is a noteworthy case of southward extension of the breeding range of a northern species, caused apparently neither by changes in climate nor an abbreviated migration. The Redwings seem to have occupied this locality in response to the recent growth of willow which has sprung up as the lake dried and became marshland. This provides the same habitat the species favors in the north.—Louise de Kiriline Lawrence.

86. Birdlife at the Visby coast the winter 1956. (Något om fågellivet vid Visby-kusten vintern 1956.) Gösta Håkansson. 1956. *Vår Fågelvärld*, **15**(4): 248-251. (English summary.) Ice formed in the Baltic Sea around the island of Gotland during the cold winter of 1956 and drove large flocks of wintering sea-birds into the harbor of Visby in search of open water. Sixteen species were observed, including ducks, eiders, loons, swans, guillemots, and cormorants. Despite efforts to provide food for these birds, many died from starvation. Before the ice broke up in late March, migrating Black-headed Gulls *(Larus ridibundus)* arrived already in full summer plumage while the winter populations still retained their winter-dress. Ice formation and oil pollution are considered the greatest hazards of the sea-bird populations around the coasts of Sweden.—Louise de K. Lawrence.

87. Scarlet Grosbeaks in northern Sweden. (Rosenfinken i Skellefteå 1955.) G. Öberg. 1956. *Sveriges Natur*, (1): 21-24. In June 1955, a blind person successfully identified a singing Scarlet Grosbeak *(Carpodacus erythrinus)* in the neighborhood of Skellefteå through his acute hearing and good memory of a record played several years earlier in the radio. The author confirmed the discovery of a male in full plumage accompanied by a female which apparently also sang. A nest was subsequently found, built "nearly" on the ground in tall grass at a roadside filled with dense undergrowth. One egg was laid, but the birds deserted the nest when disturbed. Although a few earlier occurrences of the species are reported from the region, this is the first evidence of breeding.—Louise de K. Lawrence.

88. The House Wren in Tennessee. Lee R. Hendron. 1956. *Migrant*, **27**(2): 23-30. A report of all the references to *Troglodytes aedon* in Tennessee appearing in the *Migrant* during the last 25 years. The House Wren has recently established itself as a breeding species in eastern Tennessee and appears to be spreading southwestward. One of the writers speaks of the House Wren as driving out Bewick's Wren *(Thryomanes bewickii)*, but on the whole the former settles in residential sections of towns and cities, while the latter prefers farm homes. A map with some method of indicating first breeding records in different localities would have been helpful.—M. M. Nice.

89. Photographic Studies of Some Less Familiar Birds. LXXVI. Osprey. Photographed by M. D. England. 1956. *British Birds,* **49**(12): 489-493. "Like a number of the birds of prey, the Osprey *(Pandion haliaetus)* is a widespread species and has a breeding-range which extends from Alaska in the northwest to Australia in the south-east. It is, however, mainly a bird of the northern hemisphere." At one time it nested rather commonly in Scotland, but was extirpated by egg collectors by 1908. Two pairs attempted to nest there in 1955 and 1956 and the writer deplores the publicity given them "on the wireless and in the press." Ten fine photographs of "these magnificent birds" are shown; they were taken in Sweden. Incubation lasts 5 weeks and is shared by the male who also brings food to his mate on the nest and the major part of the food for the young during the 8- to 10-week fledging period.—M. M. Nice.

FOOD

(See also numbers 32, 45, 48, 71, 81)

90. Feather-Eating and Pellet-Formation in the Great Crested Grebe. K. E. L. Simmons. 1955. *British Birds,* **49**(11): 432-435. A new theory of the function of feather eating by grebes has been proposed by Hanzak (1952, *Acta Mus. Nat. Prague,* 8B: 6-37), namely that the feathers envelope the fish bones apparently to form ejectable pellets. Simmons accepts this view, although he admits: "As yet, no one seems to have seen the actual ejection of such a pellet and the pellet itself is unknown."

This seems to lie in the realm of conjecture. After extensive observation of Western Grebes *(Aechmophorus occidentalis)* and a study of their food which involved examination of 27 stomachs, G. E. Lawrence (1950, *Condor,* **52**: 3-16) agrees with the prevailing opinion: "The feather mass which completely fills the stomachs of Western Grebes appears to function to protect the inner lining of the stomach from the sharp bones of fish, it also prevents undigested bones from passing into the lower alimentary tract." He states: "The Western Grebe does not regurgitate undigested bones, scales and chitinous parts. These sharp objects have been found in many states of erosion by digestive action. Vertebral segments often were found discolored and spineless in the very center of the feather mass. The presence of the limpet shells and small stones also indicates that material not readily digested remains in the grebe stomach until it is softened or eroded."—M. M. Nice.

91. Feeding Association between Coot and Little Grebe. N. P. Ashmole, R. G. B. Brown and N. Tinbergen. 1956. *British Birds,* **49**(12): 501. In January 1956 five *Podiceps ruficollis* were noted closely attending individual *Fulica atra* that were diving in shallow water; the Grebe "would always dive just after the Coot had done so." "It seems probable that the Little Grebes were in this case feeding on Crustaces or other small animals disturbed by the Coot."—M. M. Nice.

92. Lapwing Chicks "pattering" and Feeding on Tadpoles. G. L. Boyle. 1956. *British Birds,* **49**(12): 502. Four *Vanellus vanellus* chicks were noted using the "foot-pattering" action in feeding "when less than a fortnight old." The chicks from this age caught tadpoles, beating them on the ground before swallowing them. They never took more than one or two at a time, although the pool was swarming with this prey.—M. M. Nice.

93. Concerning the Food of Our Forest Birds. (Über die Ernährung unsere Waldvögel.) Kurt Ruppert and Richard Langer. 1955. *Die Vogelwelt,* **76**(3): 93-102. Analysis and discussion of 120 stomach contents of 11 species of birds, chiefly *Parus major, Sturnus vulgaris, Turdus merula,* and *Fringilla coelebs.*—Frances Hamerstrom.

94. What do the raptors eat? (Vad äter rovfåglarna?) Kai Curry-Lindahl. 1956. *Sveriges Natur,* (3): 86-90. In connection with efforts to achieve the protection of all owls, falcons, and buzzard hawks, tables were worked out on the feeding biology of various species. Of nine species of owls, the Pygmy Owl *(Glaucidium passerinum)* and the Snowy Owl *(Nyctea scandiaca)* were the only

ones whose diet included birds to a small extent. The owls feed overwhelmingly on mice, rats, voles, shrews and other small mammals. The Merlin *(Falco columbarius)* and the Peregrine Falcon *(Falco peregrinus)* feed on birds, but in the food list of the latter crows occupied first place, nearly 22 per cent. The Hobby *(Falco subbuteo)* lives mostly on insects, the Kestrel *(Falco tinnunculus)* on insects and small mammals, and the normal food of the Buzzard *(Buteo buteo)* consists in the main of insects, reptiles, amphibians, and small mammals.—Louise de K. Lawrence.

95. Feeding Habits and Seasonal Movements of Mute Swans on Two South Devon Estuaries. Mary E. Gillham. 1956. *Bird Study*, **3**(3): 203-212. Mute Swan grazing influences the vegetation of estuarine salt marsh turf considerably. They graze succulent plants and the semisucculent marsh grass most severely and wastefully, severing much of the vegetation and leaving it to wilt. Seasonal variations in food preferences lead to local migrations from one area to another.—O. L. Austin, Jr.

96. The Food of Nestling Jays and Magpies. D. F. Owen. 1956. *Bird Study*, **3**(4): 257-265. Analyzes a large number of food samples collected over a 3-year period from nestling Jays *(Garrulus glandarius)* and Magpies *(Pica pica)* by the Kluijver "collar" method. The nestling jays were fed chiefly on Lepidoptera larvae from oaks and other broad-leaved trees (86 percent), with Coleoptera, Diptera, and Arachnids of secondary importance. Lepidoptera larvae made up 46 percent of the nestling magpie diet, Coleoptera 21 percent, Diptera 16 percent. Most members of the crow family, and a number of other British woodland passerines as well, feed their young predominantly on these defoliating caterpillars in late spring. As the author points out, "It would be interesting to know if the combined efforts of all these birds have more than a negligible effect on the caterpillar population."—O. L. Austin, Jr.

SONG

(See also number 34)

97. Bird Songs of Dooryard, Field and Forest, Volume III, From the Rockies to the Pacific. Recorded by Jerry and Norma Stillwell, published by Ficker Records, Old Greenwich, Conn. 1956. 33 1/3 r.p.m. $7.95. This long-playing record includes 220 songs and calls of 68 western species. Most of these species have not been represented on Stillwell records before, and the remainder are represented here by different races. The new record shares the virtues of the other two—accurate reproduction, quiet surfaces, a wide variety of songs and calls, and convenient grouping of related species. It should find an active sale among those living in the western third of the country, and among those going west on trips. It has been my own experience that such records are invaluable even for short trips, making it possible to recognize many species on first hearing. For reviews of the two earlier Stillwell records, see *Bird-Banding*, **24**: 85-86 and **25**: 170-171.—E. Alexander Bergstrom.

98. Homologization of Bird Sounds. (Homologisierung von Stimmäusserungen bei Vögeln.) Albrecht Faber. 1955. *Die Vogelwarte*, **18**(2): 77-84. (Translation of author's summary.) "This paper is to show how order can be brought in the diverse, apparently entirely heterogeneous structure of bird song. It appears that evolutionary relationships are truly to be found in the forms of sounds, even when the relationships apparently seem unrecognizable. Five species of Warblers *(Phylloscopus)* are analyzed [including oscillograms] and are compared as an example."—Frances Hamerstrom.

99. Concerning Vocal Sounds of the Black Woodpecker, Green Woodpecker, Grey-headed Woodpecker, and the Great Spotted Woodpecker. (Über die stimmlichen Lautäusserungen bei Schwarzspecht, Grünspecht, Grauspecht und Buntspecht.) Dieter Blume and Georg Jung. 1956. *Vogelring*, **25**(2): 60-75. Woodpecker sounds are of three main types: "Kik," "Kui," and "Krr." All calls are used by both sexes. Some calls may signify general excitement, some are uttered in conflict situations, many promote keeping

distance between individuals. Mates have "presence," "correspondence," and "locating" calls in their large territories. Finally, there are calls to lead to the hole, and synchronization and stimulatory pair-building calls. Specific warning and fright, as well as social contact, calls are lacking. Calls of mates changing places at the nest or meeting within the nest territory are more on the order of subdued threats than greeting. Calls of the following species throughout the year are taken up individually: *Dryocopus martius, Picus viridis, P. canus* and *Dendrocopos major.*—Frances Hamerstrom.

100. On the singing of a female Pine Grosbeak. (Om en syngende hun av konglebit, *Pinicola enucleator.*) A. Bernhoft-Osa. 1956. *Vår Fågelvärld,* **15**(4): 245-247. (English summary.) Evidence of the ability to sing was obtained from the female when a pair of wild Pine Grosbeaks, captured in the fall of 1954, began singing together during the following spring. Copulation occurred and the singing female laid seven eggs in June. As she was unable to build a nest in the cage, the eggs did not hatch. It seems strange that adequate facilities for nesting were not provided, which might have revealed further valuable data. The female sang again the next spring but laid no eggs.—Louise de K. Lawrence.

BOOKS

101. Louisiana Birds. George H. Lowery, Jr. Illustrated by Robert E. Tucker. 1955. Published for Louisiana Wild Life and Fisheries Commission by Louisiana State University Press. xxiii + 556 pp., 40 pls., 135 figs., numerous photographs. $5.00. Dr. Lowery has achieved, in an outstanding fashion, the goal he set for himself. His prefatory comment, "This is not a state bird book in the traditional sense. Its one objective is to introduce the people of Louisiana to the absorbing subject of ornithology, mainly through the medium of that wealth of bird life which is their heritage," is a concise description of the contents of this beautifully produced book. George Lowery actually was much too modest in the quoted sentences. He has produced a bird book which will be appreciated on many fronts. The people of Louisiana will not be its only admirers. In my opinion the approach he has used can well serve as a model for other states to follow. The author adds that a technical work on the birds of Louisiana is planned at a later date.

The author has followed a plan of non-technical presentation throughout the volume. Following a brief introduction which speaks of the fascination and value of bird study he treats successively: "Louisiana as a Place to See Birds; History of Louisiana Ornithology; the Louisiana State University Museum of Zoology; How to Identify Birds; Feathers, Plumage, and Molt; The Bird Skeleton; Migration; Economic Value of Birds; Conservation and Wildlife Management; Attracting Birds; Ornithological Societies and Bird Clubs; and Accounts of Species." All of the subjects are given knowledgeable treatment. The accounts of species are succinct essays which include clues to identification, general information on distribution and occurrence in Louisiana, and odd bits of knowledge of a miscellaneous nature. These accounts follow no set pattern of presentation and are uniformly interesting. I must admit that Dr. Lowery's failure to mention the extensive bird-banding program as a source of information in studies of longevity, migration, etc., is a surprising oversight.

Robert Tucker's artistry has been carried intact into the pages of this work through the outstanding engravings which were done by ornithologist S. A. Grimes' Respress-Grimes Engraving Company. The photographs, mostly by Grimes and Allan Cruickshank, are uniformly of high quality.

I have only words of praise for a job well done by all concerned in the production of this pace-setting book.—J. C. Dickinson, Jr.

102. The Ornithologists' Guide—Especially for Overseas. Major-General H. P. W. Hutson, editor. 1956. British Ornithologists Union, London. 275 + xix pp., 34 text figs. 21 s. (distributed in the U. S. by the Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y., at $6.00) While this is the third such compendium of ornithological knowledge to be published in the last two years, it is none the less welcome. Few single volumes cover such a wide range

of subjects. It treats briefly of our current knowledge of many topics, including polymorphism, navigational ability, learning ability, and distraction displays, and discusses such specific techniques as the management of a bird sanctuary, bird photography, skinning and preserving, and the collection of bird parasites. Its list of 46 contributors reads like an honor roll of British ornithologists, and includes a number of eminent naturalists from other parts of the world, especially the British Commonwealth.

The guide is divided into 9 major sections, 8 of which are further subdivided into a total of 67 subsections. As might be anticipated, space is lacking to develop reviews of various individual aspects of ornithology to the extent possible in the recent compendium published by the American Ornithologists' Union *(Recent Studies in Avian Biology*, Albert Wolfson, ed., University of Illinois Press, 1955). Compared to *The Bird Watcher's Reference Book* (see *Bird-Banding* **28:** 110-111) its list of ornithological organizations and of nature preserves in various parts of the world is quite brief, and it does not attempt to include a detailed glossary. Devised by the B.O.U. for its members who either live permanently in distant parts of the world or who travel abroad for long periods, it is well worth including in the working library of any active ornithologist.—E. Alexander Bergstrom.

103. Bird-Ringing, the Art of Bird Study by Individual Marking. R. M. Lockley and Rosemary Russell. 1953. John de Graff, Inc., 31 East 10th Street, New York 3, N. Y. 119 pp., ill. $2.50. This useful manual, which should be on every bander's reference shelf, is now available as above. The American publisher lists a U. S. "publication date" of 30 September 1956, but the review copy accompanying the announcement is the original British edition with the de Graff, Inc., imprint pasted over the Crosby Lockwell & Son Ltd's on the title page. No changes have been made in the original, for a review of which see *Bird-Banding* **25**(2): 80-81.—O. L. Austin, Jr.

NOTES AND NEWS

Mr. Low, the author of the leading paper in this issue, has banded birds in many parts of the country, but in Massachusetts, North Dakota, Oklahoma and Maryland in particular. While employed by the O. L. Austin Ornithological Research Station on Cape Cod, he became familiar with Italian nets, and uses Japanese mist nets extensively on his farm in Maryland, and, in September, at Cape May, N. J.

The Reed holding cages referred to in that paper are sold by the Massachusetts Audubon Society, 155 Newbury St., Boston 16, Mass. The price of the 8-cell cage is $13.50; that of the 12-cell cage is $18.00. Shipment, by express, adds about $1.80 or more depending on distance.

For details of price and availability of three sizes of Japanese mist nets handled by the Northeastern Bird-Banding Association, write to E. Alexander Bergstrom, 37 Old Brook Road, West Hartford 7, Conn.

A major problem for a bander who would like to use nets is where to obtain first-hand instruction in setting up nets and taking birds out of them. Any bander within easy reach of Drumlin Farm Wildlife Sanctuary at South Lincoln, Mass. (just west of route 128 and just north of the new Massachusetts Turnpike) is welcome at times when nets are being operated; write to Dr. William H. Drury, Jr., at that address. Similarly, a bander within reach of West Hartford, Conn., will be welcome at the station of E. Alexander Bergstrom; write to him at 37 Old Brook Road, West Hartford.

We have a request for four issues of the *Bulletin of the Northeastern Bird-Banding Association*, the predecessor of *Bird-Banding:* volume 1, numbers 1 and 4; volume 2, number 4; volume 4, number 2. If any reader is willing to sell these, or knows of any for sale, it would be very much appreciated if he would write to Dr. Robert A. McCabe, Dept. of Forestry and Wildlife Management, University of Wisconsin, 424 University Farm Place, Madison 6, Wisc.

Dr. Helmut K. Buechner of our reviewing staff is in Africa on a Fulbright fellowship. His present address is Poste Restante, Masindi, Uganda. He writes that he expects to return in June 1958, and meanwhile is "having a wonderful time learning the birds of East Africa." In his absence we have been fortunate in obtaining Dr. Oliver H. Hewitt of Cornell University to review the wildlife management literature.

After several years as a Senior Editor for the Arctic, Desert, Tropic Information Center and Professor of Zoology at the Air University in Montgomery, Alabama, Dr. Oliver L. Austin, Jr., our review editor, is leaving in late summer to take up a newly-created post as Curator of Birds at the Florida State Museum, Gainesville, Florida.

The A.O.U. has appointed a committee to organize aid to Hungarian ornithologists. The Bird Room of the Hungarian National Museum was burned in late 1956, and as the Ornithological Institute (also in Budapest) was destroyed not too many years earlier (1945), there is a great lack of scientific books and periodicals. If you can send some, write to Dr. Frederick Greeley, Illinois Natural History Survey, Urbana, Ill., and descibe what you have. Warm *second-hand* clothes are also welcome; write to Dr. Greeley with a description, including sizes, and he will send you the address of some Hungarian ornithologist who can use them. New clothing should not be sent, as there is a Hungarian duty on it. Those wishing to contribute checks should make them out to "Frederick Greeley (Hungarian Relief)."

Though we have received a number of fine manuscripts in recent months, the greater size of issues still makes it possible for us to offer very early publication dates.

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

Published quarterly for:

THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
THE INLAND BIRD-BANDING ASSOCIATION

Applications for membership in these associations should be sent to their respective secretaries. The annual membership dues of $5 per year in the Northeastern Association include a subscription to *Bird-Banding*. Membership in the Eastern and Inland Associations is $2 each per year; members of those associations who wish to receive *Bird-Banding* may send $4 direct to the secretary-treasurer. Subscription price to non-members of the associations is $5 per year; single copies $1.25.

Editor, E. Alexander Bergstrom, 37 Old Brook Road, West Hartford 7, Conn.

Review Editor, Oliver L. Austin, Jr., Curator of Birds, Florida State Museum, Gainesville, Fla.

Secretary-Treasurer, Daniel P. Johnson, Box 730, Osterville, Mass.

Review Staff

Bender, R. O., R.D. 1, Bridgeton, N. J.
Buechner, Helmut K., Dept. of Zoology, The State College of Washington, Pullman, Wash.
Dickinson, J. C., Jr., Dept. of Biology, Univ. of Florida, Gainesville, Fla.
Hamerstrom, Frances, Wisconsin Conservation Dept., Plainfield, Wisc.
Lawrence, Mrs. Louise de K., Pimisi Bay, Rutherglen, Ontario, Canada
Mewaldt, L. R., Dept. of Natural Sciences, San Jose State College, San Jose, Calif.
Nice, Margaret Morse, 5725 Harper Ave., Chicago 37, Illinois

All articles and notes for publication should be submitted in standard typed form to the editor; publications for review should be sent to the review editor. Reprints of articles should be ordered early from the editor; current prices are as follows:

No. Copies	4 Pages	8 Pages Self-Cover	12 Pages Self-Cover	16 Pages Self-Cover	Add for Separate Cover
25	4.75	7.75	10.25	12.00	2.75
50	5.50	8.50	11.00	13.25	3.00
75	6.50	9.00	12.00	14.50	3.25
100	7.75	9.50	13.00	15.50	3.50
150	8.50	10.25	13.75	16.75	4.00
200	9.00	10.75	14.75	18.00	4.25

Officers of the Three Bird-Banding Associations

Northeastern

Edwin A. Mason, *President*
Vice-Presidents (with year of expiration of terms)
Mrs. B. M. Shaub ('57), R. M. Hinchman ('58), T. H. Foster ('59), J. A. Hagar ('60), P. C. Reed ('61)
Daniel P. Johnson, *Secretary and Treasurer*, Box 730, Osterville, Mass.

Councillors (with year of expiration of terms)

Mrs. E. P. Cook ('57) — L. M. Bartlett ('58)
Mrs. J. R. Downs ('57) — O. L. Austin, Jr. ('59)
G. E. Ramsdell ('57) — W. H. Drury, Jr. ('59)
J. W. Stewart ('58) — Ernst Mayr ('59)
James Baird ('58)

C. H. Blake, L. B. Chapman, A. O. Gross, F. M. Saunders, *ex-Presidents*

Eastern

Dr. Paul H. Fluck, *President*
Joseph M. Cadbury, Mrs. J. Y. Dater, Richard D. Cole, *Vice-Presidents*
Mrs. Stanley S. Dickerson, *Treasurer*, 222 DeVoe Ave., Spotswood, N. J.
Rev. Garrett Detwiler, *Secretary*, 194 7th St., Salem, N. J.
Frank P. Frazier, *Editor*, 424 Highland Ave., Upper Montclair, N. J.

Councillors (with year of expiration of terms)

Maurice Broun ('58) — Merrill Wood ('59)
Arthur H. Fast ('58) — Orville Crowder ('60)
Mrs Howard McEntee ('58) — Gordon Hight ('60)
Geoffrey Gill ('59) — R. J. Middleton ('60)
William Pepper ('59)

Inland

Edward W. Peartree, *President*
J. J. Hickey, James B. Cope, R. W. Dexter — A. Lang Bailey, Charles Kossack — *Vice-Presidents*
P. R. Macklin, *Secretary*, Bryant, Ind.
Karl E. Bartel, *Treasurer*, 2528 W. Collins St., Blue Island, Ill.
A. J. Roth, *Editor*, R.R. 1, Bellevue, Ohio